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Highlights

Circuit Theory Methods

Simulation of Gear Dynamics

Passenger Safe Car

High Level Sport Performance

Discovering Thoughts, Inventing Future

VOLUME 14 ISSUE 8 VERSION 1.0

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Simulation of Gear Dynamics by Circuit Theory Methods

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Abstract- A methodology of study of gear dynamics with the aid of the circuit theory and linear graph methods is presented. In terms of analogy of the force, electric tension is used for the composition of equivalent electrical circuit, which immediately gives the equations of motion. The application of the electrical analogy method for the automation of composition of equation of motion and their analysis are considered for the classical example of a one-stage gear transmission with flexible supports and coupling masses. This technique can be extended to analyse the dynamic characteristics of more complex dynamic systems as a planetary transmission with flexible supports.

Keywords: dynamic gear model, equivalent electric circuit, linear graph, node equations, automation of composition of motion equations.

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Simulation of Gear Dynamics by Circuit Theory Methods

Evgueni I. Podzharov[α], Jorge Alberto Torres Guillén[σ] & Julia Patricia Ponce Navarro[ρ]

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Keywords: dynamic gear model, equivalent electric circuit, linear graph, node equations, automation of composition of motion equations.

I. Introduction

The classical method of Lagrange equation (Genkin and Grinkevich, 1961) and the methods of dynamic stiffness or admittance (Airapetov et al. 1975) are used in studies of gear dynamics. These methods are cumbersome and laborious. In order to automate composition of equations of motion, the bond graph (Karnopp and Rosenberg, 1972) and some other methods are also used. However, the use of these methods presupposes presentation of a dynamic model as a system with concentrated parameters. Also, the bond graph of a relatively simple model, as, for example, a planetary gear transmission, is very cumbersome (Allen, 1979). On the other hand, electrical analogy method (Skudrzyk, 1968) and linear graph method (Mason and Zimmermann, 1960) allow us to model dynamic systems with both concentrated and distributed parameters (Podzharov, 1983, 1987, Sasa et al., 2004, Wojnarowski, 2006, Kalous, 2009).

In this paper a methodology of study of gear dynamics with the aid of the electric circuit theory methods is presented. The analogy between the force and electric tension is used to compose equivalent electric circuits for dynamic gear systems.

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Table 1 : Equivalent Parameters

No.	Mechanical System	Electrical System
1	Force	Tension
2	Speed	Electric current
3	Displacement	Electric charge
4	Mass	Inductance
5	Flexibility	Capacitance
6	Absorber	Electrical resistance

Nomenclature

J_i - moment of inertia of the mass m_i ,

k_i - torsional stiffness

C_{S2}, C_{S3} - support stiffnesses,

C_3 - stiffness of tooth engagement,

$T_1(t), T_2(t)$ - variable torsion moments,

μ_i - moment of inertia reduced to the mass moving on the line of action,

C_i - torsion stiffness reduced to linear stiffness on the line of action,

r_{bi} - base radius of a gear,

$F_i(t)$ - torsional moment reduced to a force applied in the line of action of gear engagement,

$S_i(t)$ - kinematic error in the gear engagement,

y_{ij} - element of the matrix of mechanical conductance,

Y - matrix of mechanical conductance,

Z - mechanical impedance,

T_{ij} - transmission in a graph between the points *i* and *j*,

f - frequency,

$j = \sqrt{-1}$.

II. Modelling One-Stage Gear Transmission

We shall now consider the use of electrical analogy for the automation of composition of equations of motion and their analysis in the example of one-stage gear transmission with flexible supports and coupled masses. The mechanical model of the transmission is shown in Fig.1 and in Fig. 2, presenting the equivalent electrical circuit. Here, the parameters of the torsion system reduced to the parameters of a linear system are determined as follows:

$$\mu_i = J_i / r_{bi}^2,\ C_{ki} = k_i / r_{bi}^2,\ F_i(t) = T_i(t) / r_{bi} \qquad (1)$$

This system has 10 independent elements and 11 resonances and antiresonances (Skudrzyk, 1968), including zero and infinite frequencies. When the circuit is excited by variable tensions (forces) $F_1(t)$ and $F_2(t)$ the contours $C_1\mu_1$ and $C_3\mu_4$ act as low frequency filters filtering out high frequency components. Thus, the existence of large coupled masses linked to the gears by relatively low stiffness shafts means that the gears are dynamically isolated from external excitation in medium and high frequency ranges.

Let us consider stationary vibrations and assume that the gear is a linear dynamic system. Then, the solution of this system with periodic force or kinematic excitation can be found as a sum of harmonics. In this case the equations of motion can be composed as Kirchhoff equations of the equivalent electric circuit.

The total conductance between the points *a* and *b* will be equal to the sum of the conductances of parallel branches (Skudrzyk, 1968).

$$Y_{ab} = Y_0 + Y_1 + Y_2 + Y_3 + Y_4, \qquad (2)$$

where

$$Y_0 = j\omega / C_2,\ Y_2 = \left(j\omega m_2 + C_{S2} / j\omega\right)^{-1},$$

$$Y_1 = \left[\left(\frac{1}{j\omega\mu_1} + \frac{j\omega}{C_1}\right)^{-1} + j\omega\mu_2\right]^{-1},$$

$$Y_3 = \left(j\omega m_3 + C_{S3} / j\omega\right)^{-1},$$

$$Y_4 = \left[\left(\frac{1}{j\omega\mu_4} + \frac{j\omega}{C_3}\right)^{-1} + j\omega\mu_3\right]^{-1}. \qquad (3)$$

The input impedance between points *a* and *b* can be found as inverse of Y_{ab}

$$Z_{ab} = 1 / Y_{ab}. \qquad (4)$$

Substituting the equations (3) in the equation (2) and (4) and making Z_{ab} equal zero, we can find a frequency characteristic of Z_{ab}, which is shown in Fig. 3 for the transmission with the following parameters:

$J_1 = 0.012\ kg\,m^2$, $J_2 = 0.000686\ kg\,m^2$, $J_3 = 0.00471\ kg\,m^2$, $J_4 = 0.02\ kg\,m^2$, $m_2 = 1.56\ kg$, $m_3 = 3.8\ kg$, $C_{S2} = 0.455\cdot 10^8\ N/m$, $C_{S3} = 0.101\cdot 10^8\ N/m$, $C_{S2} = 0.27\cdot 10^9\ N/m$, $k_1 = 4270\ N\cdot m$, $k_3 = 2000\ N\cdot m$, $r_{b2} = 0.0383\ m$, $r_{b3} = 0.0634\ m$.

It was calculated neglecting the damping in the system and, according to the Foster theorem (Skudrzyk, 1968), it has a monotonous character. We can find from the curve that the poles are at frequencies 55 Hz, 209 Hz, 300 Hz, 794 Hz and 5200 Hz. The zeros are at the frequencies 115 Hz, 259.5 Hz, 408 Hz and 859.5 Hz.

The poles f_{pi} and zeros f_{sj} can also be found approximately from the concepts of parallel and successive resonances or resonances of tensions and currents:

$$f_{p1} = \frac{1}{2\pi}\sqrt{\frac{C_1}{\mu_4}} = 50\ Hz, \qquad (5)$$

$$f_{p2} = \frac{1}{2\pi}\sqrt{\frac{C_2 + C_{S2}}{\mu_3 + m_3}} = 232\ Hz,$$

$$f_{p3} = \frac{1}{2\pi}\sqrt{\frac{C_{S1}}{m_2 + \mu_1 + \mu_2}} = 336\ Hz, \qquad (7)$$

$$f_{p4} = \frac{1}{2\pi}\sqrt{\frac{C_1 + C_{S2}}{\mu_{23} + m_2}} = 778\ Hz, \qquad (8)$$

$$f_{p5} = \frac{1}{2\pi}\sqrt{C_2\left(\mu_2^{-1} + \mu_3^{-1} + m_2^{-1} + m_3^{-1}\right)} = 5162\ Hz \qquad (9)$$

$$f_{S1} = \frac{1}{2\pi}\sqrt{\frac{C_3}{\mu_3}} = 104\ Hz, \qquad (10)$$

$$f_{S2} = \frac{1}{2\pi}\sqrt{\frac{C_{S3}}{m_3}} = 259.5\ Hz, \qquad (11)$$

$$f_{S3} = \frac{1}{2\pi}\sqrt{\frac{C_1}{\mu_2}} = 397\ Hz, \qquad (12)$$

$$f_{S4} = \frac{1}{2\pi}\sqrt{\frac{C_{S2}}{m_2}} = 859.5\ Hz, \qquad (13)$$

As we see, the approximate and exact frequencies are very similar to each other. Therefore, the formulas (5) – (13) can be used for the analysis of resonances.

Now, let us use the linear graph method (Mason and Zimmermann, 1960) to obtain a general form for this model. A linear graph for the circuit in Fig. 2 is constructed in Fig. 4. This graph illustrates the relations between forces F_i (upper nodes) and velocities v_i (lower nodes). The lines between them are transmissions, which in this case are mechanical admittances y_i or mechanical impedances z_i. Thus, in this graph we use relations

$$v_i = y_i \cdot F_i \quad \text{and} \quad F_i = z_i \cdot v_i \tag{14}$$

In order to simplify the graph, the number of nodes can be reduced retaining only the nodes which we need to determine. Further simplification of the graph can be implemented by adding parallel transmissions and excluding the nodes, which we do not need to determine, by splitting them. Hence, splitting the nodes $F_{\mu i}$, v_{Ci}, $v_{\mu i}$ and excluding the loops l_i, we can obtain the transformed graph presented in Fig. 5.
Here,

$$y_{\mu i} = 1/(j\omega\,\mu_i),\ y_{Ci} = j\omega / C_i,$$
$$y_{Si} = 1/(j\omega\,\mu_i + C_i/(j\omega)) \tag{15}$$

The transmissions of this graph can be determined by the following formulas

$$T_{11} = \frac{y_{\mu 1}}{y_{Ci}(1-l_1)};\ T_{12} = \frac{y_{\mu 2}}{y_{Ci}(1-l_1)},$$

$$T_{21} = \frac{y_{\mu 2}}{y_{C2}(1-l_2)},\ T_{22} = \frac{1}{y_{C2}(1-l_2)},$$

$$T_{23} = \frac{y_{\mu 3}}{y_{C2}(1-l_2)},\ T_{32} = \frac{y_{\mu 3}}{y_{C3}(1-l_3)},$$

$$T_{33} = \frac{y_{\mu 4}}{y_{C3}(1-l_3)}. \tag{16}$$

Where

$$l_1 = -(y_{\mu 1} + y_{\mu 2})/y_{C1},\ l_3 = -(y_{\mu 3} + y_{\mu 4})/y_{C3},$$
$$l_2 = -(y_{\mu 2} + y_{\mu 3} + y_{S2} + y_{S3})/y_{C2}. \tag{17}$$

This graph can also be described by the equations determining the nodes in relation to adjacent nodes and transmissions that link them:

$$\begin{aligned} F_{C1} - T_{12}F_{C2} &= T_{11}F_1(t) \\ -T_{21}F_{C1} + F_{C2} - T_{23}F_{C3} &= T_{22}\dot{S}_2(t) \\ -T_{32}F_{C2} + F_{C3} &= T_{33}F_4(t) \end{aligned} \tag{18}$$

Substituting (16) and (17) in (18) and multiplying each of the *i*tch equation (18) by $y_{Ci}(1-l_i)$, we have

$$\begin{aligned} y_{11}F_{C1} - y_{12}F_{C2} &= y_{\mu 1}F_1(t) \\ -y_{21}F_{C1} + y_{22}F_{C2} - y_{23}F_{C3} &= \dot{S}_2(t) \\ -y_{32}F_{C2} + y_{33}F_{C3} &= F_4(t) \end{aligned} \tag{19}$$

Where $y_{11} = y_{C1} + y_{\mu 1} + y_{\mu 2}$, $y_{12} = y_{21} = y_{\mu 2}$,

$$y_{22} = y_{C2} + y_{\mu 2} + y_{\mu 3} + y_{S2} + y_{S3}, \tag{20}$$

$$y_{23} = y_{32} = y_{\mu 3},\ y_{33} = y_{C3} + y_{\mu 3} + y_{\mu 4}.$$

As we can see from equation (19) and (20), equation (19) has the form

$$Y \times F_c = P, \tag{21}$$

Here, the matrix of the mechanical conductance Y is symmetrical; each itch diagonal element is positive and equal to the sum of the input mechanical conductances of the elements, which enter the itch node. Each non-diagonal element is negative and equal to the transition conductance of the elements, which locate between itch and *j*-th nodes. This type of matrix is known in the circuit theory as matrix of node equations (Karni, 1966).

The excitation term in the right-hand part of the *i*-th equation is equal to the velocity of cinematic error in the gear engagement, in the case of cinematic excitation. In the case of force excitation, it equals to the product of the exciting force and the transition conductance between the point of application of the force and the itch node.

Therefore, it is not necessary to compose equivalent electric circuits and graphs. Instead, following the rules explained above, we can directly compose the matrix of mechanical conductance and the vector of the right-hand part of the equations.

The above formulated rules can be extended to more complicated systems and systems with distributed parameters.

A dynamic calculation of the gear with the parameters mentioned above was implemented using the equations (15) – (20). The damping in elastic elements was considered by introducing complex stiffness (Skudrzyk, 1968).

$$\overline{C_i} = C_i(1 + j\eta_i), \tag{22}$$

Where η_i - loss factor in *i*-th elastic element.

The results of calculation of dynamical forces F_{Ci} in elastic elements are presented in Fig.6; the amplitude of kinematic excitation $\dot{S}_2 = 5\ \mu m$ and the loss factor in all of the elastic elements was taken equal to *0.1*. As we see from the graph, in the low frequency range the dynamic forces in each elastic element are the same. The resonance at the frequency 55 Hz corresponds to the frequency of natural vibrations of mass μ_4 at the stiffness C_3, and the high frequency resonance at 5200 Hz is the natural frequency of vibrations of all masses at the stiffness C_2 of the gear engagement. The origin of all other resonances can be checked with the aid of equations (5) – (9).

The measurement of noise and vibration of this gear shows that it has high levels at frequency 5200 Hz.

III. Conclusions

a) The use of electric analogy allows us to avoid the derivation of equations of motion and to make a frequency analysis without solving the equations.

b) Equations analogous to node equations known in the circuit theory can be used in the gear dynamics for the systems with concentrated and distributed parameters.

c) There is no need to compose any electric circuit and linear graph to obtain linear equations of motion of a dynamic system. They can be composed as node equations directly for a dynamic model.

References Références Referencias

1. Airapetov E.L. et al., Computer Using for Calculation of Multilink Dynamic Systems by the Method of Dynamic Stiffness. In: *Solutions of Mechanical Problems by Computer.* Ed. by N.G. Bruevich and V.I. Sergeev. Moscow, 1975, 42-47.
2. Allen R.R., "Multiport models for the kinematic and dynamic analysis of gear power transmissions". *Journal of Dynamical Design and Technology,* 101(2), 1979, 43-53.
3. *Bond graph modeling for engineering systems*. Ed. by Karnopp D. and Rosenberg R. New York, 1972, 95 p.
4. Genkin M.D., Grinkevich V.K., *Dynamic Loads in the Transmission with Helical Gears*. Ed. Academy of Science of the USSR, 1961, 119 p.
5. Jaroslav Kalous, "Program SNAP – A tool for electromechanical drives analysis". *Engineering Mechanics*, 16(4), 2009, 251–264.
6. Karni Sh., *Network Theory: Analysis and Synthesis*. Allyn and Bacon, Inc., 1966, 368 p.
7. Mason S.J., Zimmermann H.J., *Electronic Circuits, Signals, and Systems*. John Wiley and Sons, Inc., 1960, 619 p.
8. Podzharov E. I., "Research on gear dynamics with the aid of circuit theory method". *Izvestia Vysshih Uchebnych Zavedenii. Mashinostroenie*, 5, 1983, 41-45.
9. Podzharov E. I., "Graphic modelling of the dynamic performance of multi-stage gear transmissions". *Soviet Engineering Research*, 7(7), 1987, 34-36.
10. Sasa, L. Mcphee J., Schmitke G., et al, "A comparison of different methods for modeling electromechanical multibody systems". *Multibody System Dynamics*, 12(3), 2004, 209-250.
11. Skudrzyk E., *Simple and Complex Vibratory Systems*. The Pennsylvania State University Press, 1968, 557 p.
12. Wojnarowski J., Kopec J., Zawislak S., "Gears and graphs". *Journal of Theoretical and Applied Mechanics*, 44(1), 2006, 139-162.

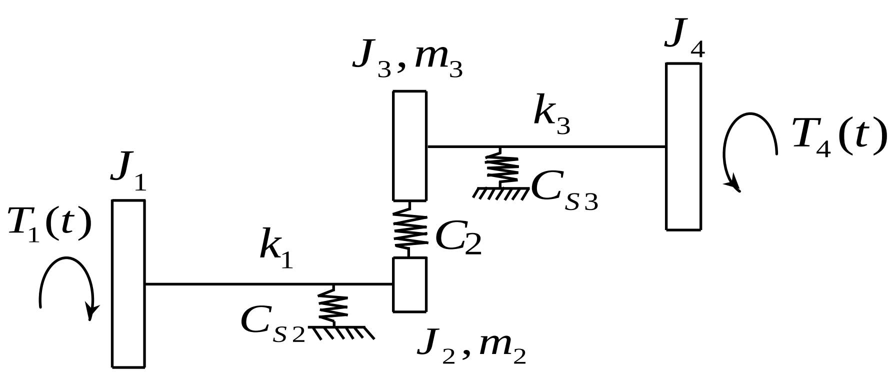

Fig. 1 : Gear dynamic model

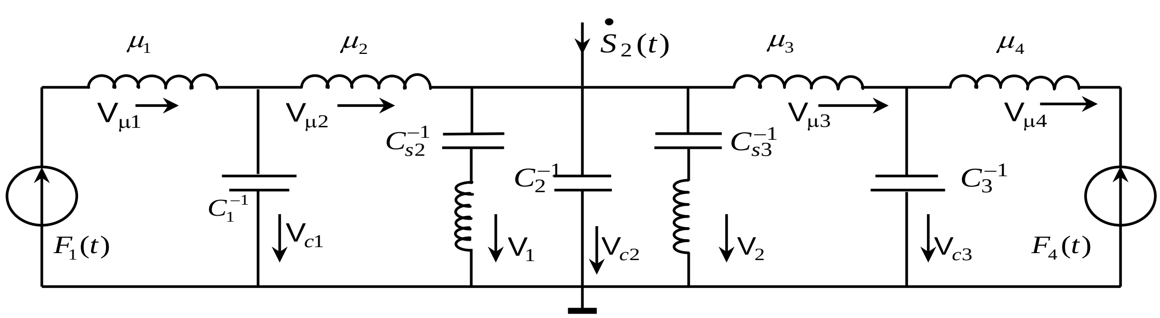

Fig. 2 : Equivalent electrical circuit

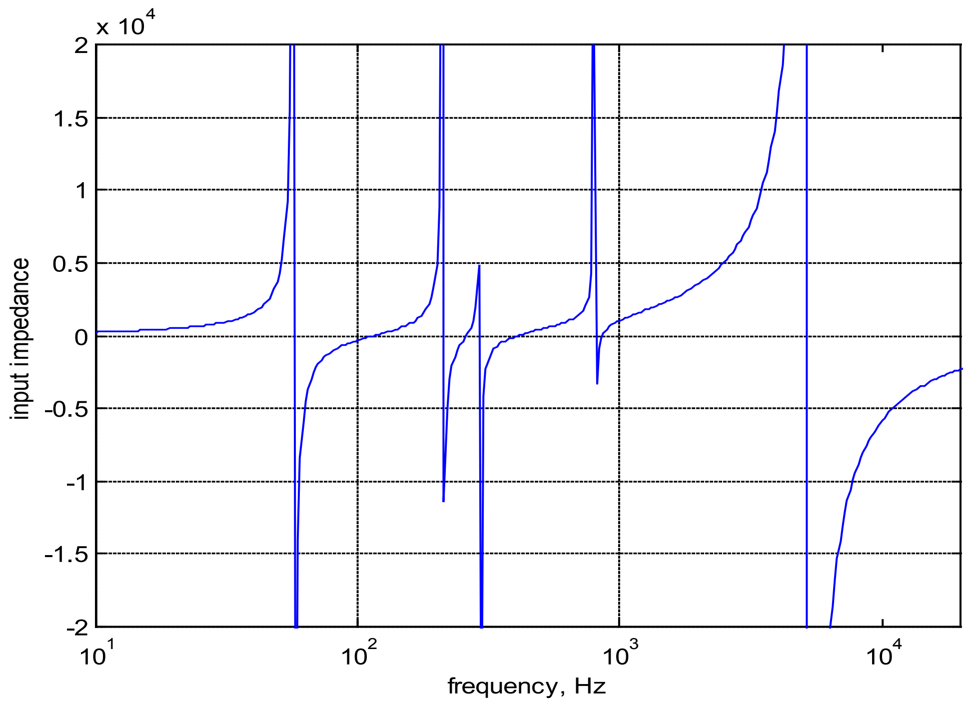

Fig. 3 : Frequency characteristic of input impedance

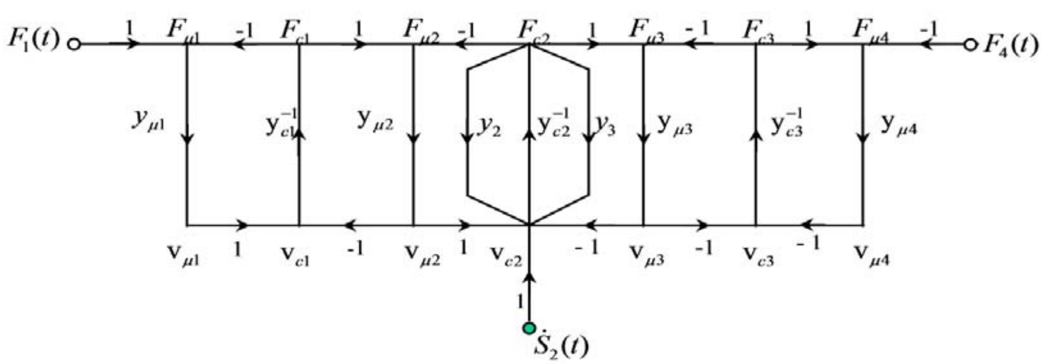

Fig. 4 : Linear graph of gear dynamic model

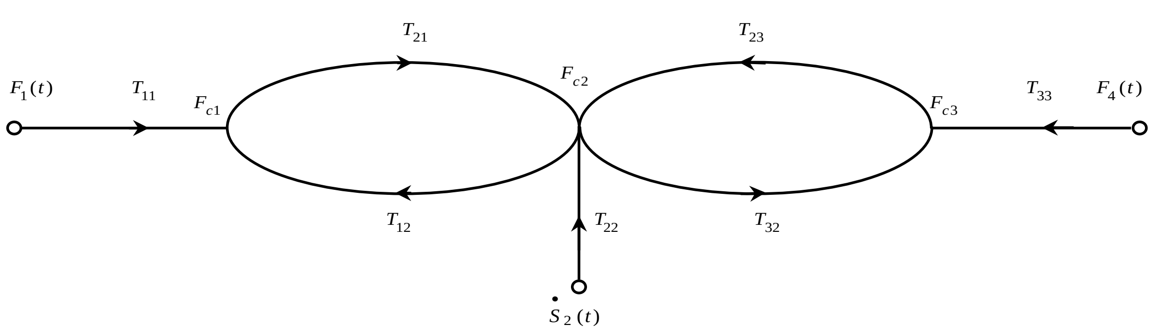

Fig. 5 : Transformed linear graph of gear dynam

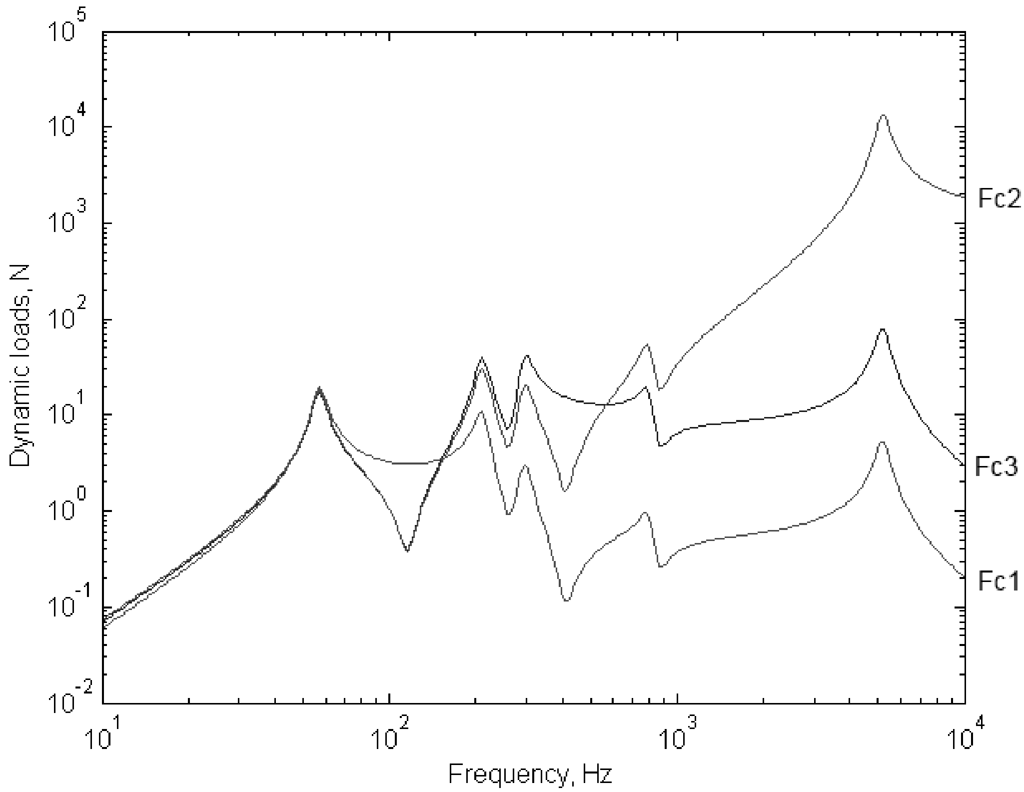

Fig. 6 Frequency characteristic of dynamic loads in the gear:
Fc1 - in the gear support, Fc3 – in the pinion support,
Fc2 – in the gear engagement

Fig. 6 : Dynamic loads in the gear

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An Inhomogeneous Gravitational Field and the Body without Center of Gravity

By Milutin Marjanov

Introduction- Concept of homogeneity (or inhomogeneity) of the gravitational field is a rather specific one. Namely, according to the Newton`s law of gravitation, either intensity or direction, or each of these two characteristics of the gravitational force acting on the body, depend on its position in the gravitational field. So, in fact, for the body as a whole, the gravitational field is always an inhomogeneous one. Such a classification makes sense only if it is restricted to the active part of the gravitational field, that is, on the part occupied by the body.

Keywords: homogeneous and inhomogeneous gravitational field newton's gravitational force gravitational moment.

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ANINHOMOGENEOUSGRAVITATIONALFIELDANDTHEBODYWITHOUTCENTEROFGRAVITY

Strictly as per the compliance and regulations of:

An Inhomogeneous Gravitational Field and the Body without Center of Gravity

Milutin Marjanov

Keywords: homogeneous and inhomogeneous gravitational field newton's gravitational force gravitational moment.

I. Introduction

Concept of homogeneity (or inhomogeneity) of the gravitational field is a rather specific one. Namely, according to the Newton`s law of gravitation, either intensity or direction, or each of these two characteristics of the gravitational force acting on the body, depend on its position in the gravitational field. So, in fact, for the body as a whole, the gravitational field is always an inhomogeneous one. Such a classification makes sense only if it is restricted to the active part of the gravitational field, that is, on the part occupied by the body.

II. Homogeneous and Inhomogeneous Gravitational Field

Consider a body of mass *m* moving in the gravitational field of the dominant gravitational center of mass m*. Assume that m/m*«1, so the gravitational field is a stationary one. Gravitational noice, as well as the gravitational anomalies, are excluded.

The motion of the body is composed: while moving in its orbit, it revolves about its principal central axis of inertia (1), which is perpendicular to the orbital plane. The mass center C of the body is chosen to be at the origin of two moving frames of reference xCy and ξCη. The first one is related to the geometry of the orbit, Cx being oriented toward the gravitational center, that is toward its mass center C*. The orbital angle is ψ. The second frame is related to the geometry of mass of the body, Cξ having direction of the principal axis (3) and Cη – direction of the axis (2) of the ellipsoid of inertia. Position of the second reference frame with respect to the first one is defined by the angle of relative rotation ϕ (Fig.1).

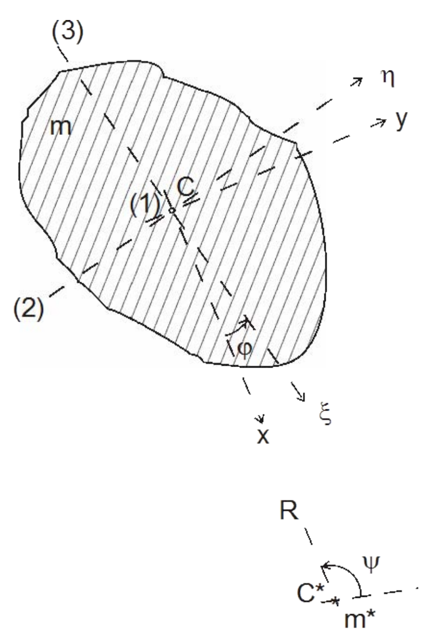

Fig. 1 : Body in the gravitational field and two frames of reference

In a homogeneous gravitational field, intensities and directions of the elementary gravitational forces acting on the body`s particles depend on the position $(\overline{CC^*} = R, \psi)$ of the mass center in the gravitational field, solely. They are functions neither of

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the positions of the particles (ξ,η) within the body, nor of the angle of relative rotation ϕ. All these forces have the same direction, that is, they are parallel to the coordinate axis Cx and their sum, the "weight" of the body, coincides with that line, regardless of the relative position of the body in the frame of reference xCy. In a homogeneous gravitational field the resultant of the ellementary gravitational forces always passes through the mass center of the body and the gravitational moment does not exist. In fact, the mass center of the body in a homogeneous gravitational field represents the center of gravity, as concieved by Archimedes some 2,5 centuries B.C. (Fig. 2).

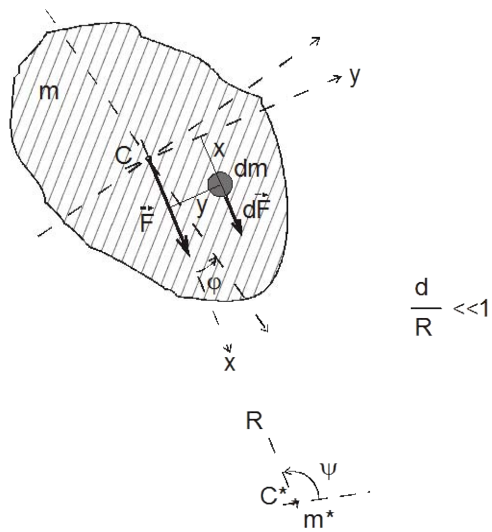

Fig. 2 : Homogeneous gravitational field

Such an interpretation of the gravitational field acting on the body is only posible if the dimensions of the body are negligible compared to the distance between the mass center of the body and of the gravitational center. If the largest dimension of the body is d, invariability of intensities and directions of the gravitational forces acting on the body`s particles imply d/R≈0 compared to unity in the approximate calculus of the gravitational load $\vec{F}, \overrightarrow{M}^{C}$.

On the other hand, if the gravitational field is inhomogenous one, at least the first power of the fraction d/R has to be retained in the expression containing unity in the course of calculus of the gravitational load. Depending on the retained power of d/R it is possible to speak of the first, the second, or the higher order inhomogeinity of the field. In the inhomogeneous gravitational field intensities and directions of the ellementary forces depend on the position of the mass center in the gravitational field, but also on the position of the particles within the body, as well as on the relative position of the body.

$$d\vec{F} = d\vec{F}(R, \Psi, \xi, \eta, \varphi)$$

All these forces converge toward the gravitational center and so does their resultant.

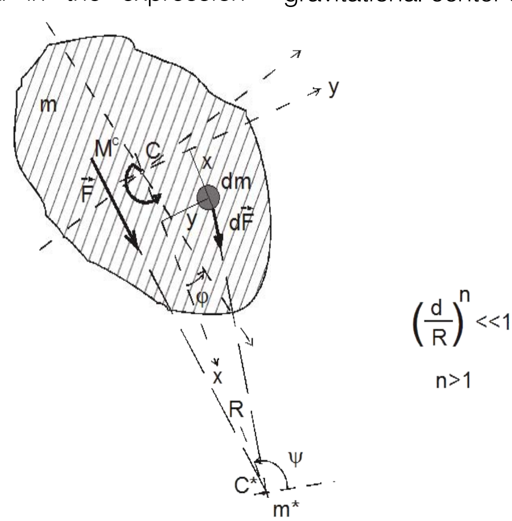

Fig. 3 : Inhomogeneous gravitational field.

Generally, this resultant doesn`t pass through the mass center of the body, so it has to produce the gravitational moment (Fig. 3).

Within the first order inhomogeneity case, the gravitational force is the same as in the homogeneous gravitational field

$$F = G\frac{m \cdot m^*}{R^2}$$

Where G is the gravitational constant and the gravitational moment for the described motion is equal

$$M^C = -\frac{3}{2}G\frac{m^*(I_2 - I_3)}{R^3}\sin 2\varphi \ ,$$

Where I_2 and I_3 are the medium and the minimum principal moments of inertia for the mass center of the body. Obviously, the gravitational moment is a harmonic function of the double angle of relative rotation, with the amplitude depending on the mass of the gravitational center, on the distance between the body and this center and finally, on the mass distribution in the body.

When the small body goes around the large body in a closed orbit, its orbital and rotational motions gradually become resonant just because of the gravitational torque existence (/3/,/4/). For example the Moon circulates around Earth and rotates around its axis in the 1/1 resonance

The first characteristic of inhomogeneity of the gravitational field is the existence of the gravitational moment, in the general case. The second one is the absence of the center of gravity of the body.

III. Body without Center of Gravity

Authors of many of textbooks are not quite precise about that point. Having, probably, in mind the existence of the gravitational moment in such a field, they often claim implicitly, or even explicitly, that in an inhomogeneous gravitational field the center of gravity doesn't coincide with the mass center of the body. This is definitely wrong, of course, because such an assertion may lead the reader to the false conclusion that there exists something like a "moving center of the gravity" in the rotating body exposed to the inhomogeneous gravitational field. There is no such a point in, or in the vicinity of the body, satisfying the definition of the center of gravity, if the body is exposed to the field of the convergent gravitational forces. The "weight" vector of the body has to pass through the point toward which converge all its components and that is the gravitational center. The relative rotation of the body produces tilting of this vector about this center (Fig. 4).

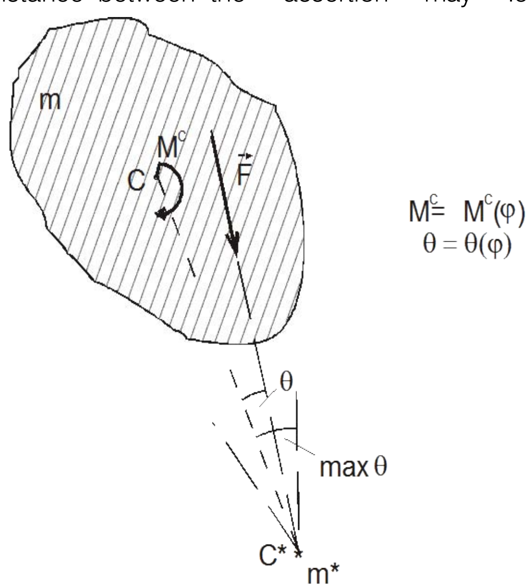

Fig. 4 : Oscillation of the gravitational force around the gravitational center

The angle between the gravitational force and the direction CC* is equal

$$\theta = \frac{3}{2}\frac{I_2 - I_3}{mR^3} \cdot \sin 2\varphi \, .$$

IV. Conclusion

We have stressed the distinction between homogeneous and inhomogeneous gravitational fields. A homogeneous gravitational field is marked by the existence of the center of gravity and the absence of the gravitational moment acting on the body. On the other hand, in an inhomogeneous gravitational field the body has no center of gravity and the gravitational moment, generally, exist. Concerning the calculus of the gravitational load, one has to adopt d/R≈0, compared to unity, for the homogeneous and at least d/R≠0, compared to unity, for an inhomogeneous gravitational field.

References Références Referencias

1. S. Hawking and W. Israel: *300 Years of Gravitation,* Cambridge University Press, 1989.
2. C. W. Misner, K. S. Thorne, J. A. Wheeler: *Gravitation,* W.H. Freeman and Comp, San Francisco, 1973.
3. Marjanov M. 1997. Gravitational Resonances, Bull. Astron., Belgrade, 156, 9 – 19.
4. Marjanov M.: One Solution of the Newton's Three Body Problem, www.milutinmarjanov.com.

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Concept of the Dispersion of Electric and Magnetic Inductivities and its Physical Interpretation

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I. Introduction

How the idea of ε and μ-dispersion appeared and evolved is illustrated vividly in the monograph of well-known specialists in physics of plasma [1]: while working at the equations of electrodynamics of material, media, G. Maxwell looked upon electric and magnetic inductivities as constants (that is why this approach was so lasting). Much later, at the beginning of the XX century, G. Heavisidr and R.Wull put forward their explanation for phenomena of optical dispersion (in particular rainbow) in which electric and magnetic inductivities came as functions of frequency. Quite recently, in the mid-50ies of the last century, physicists arrived at the conclusion that these parameters were dependent not only on the frequency but on the wave vector as well. That was a revolutionary breakaway from the current concepts. The importance of the problem is clearly illustrated by what happened at a seminar held by L. D. Landau in 1954, where he interrupted A. L. Akhiezer reporting on the subject: “Nonsense, the refractive index cannot be a function of the refractive index”. Note, this was said by L. D. Landau, an outstanding physicist of our time.

What is the actual situation? Running ahead, I can admit that Maxwell was right: both ε and μ are frequency – independent constants characterizing one or another material medium. Since dispersion of electric and magnetic inductivities of material media is one of the basic problems of the present – day physics and electrodynamics, the system of views on these questions has to be radically altered again.

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II. Plasma Media

It is noted in the introduction that dispersion of electric and magnetic inductivities of material media is a commonly accepted idea [1-5]. The idea is however not correct.

To explain this statement and to gain a better understanding of the physical essence of the problem, we start with a simple example showing how electric lumped-parameter circuits can be described [6]. As we can see below, this example is directly concerned with the problem of our interest and will give us a better insight into the physical picture of the electro dynamic processes in material media.

In a parallel resonance circuit including a capacitor C and an inductance coil L, the applied voltage U and the total current I_Σ through the circuit are related as

$$I_\Sigma = I_C + I_L = C\frac{dU}{dt} + \frac{1}{L}\int U\,dt\ ,$$

where $I_C = C\frac{dU}{dt}$ is the current through the capacitor, $I_L = \frac{1}{L}\int U\,dt$ is the current through the inductance coil. For the harmonic voltage $U = U_0 \sin \omega t$

$$I_\Sigma = \left(\omega C - \frac{1}{\omega L}\right)U_0 \cos \omega t\ . \qquad (2.1)$$

The term in brackets is the total susceptance σ_x of the circuit, which consists of the capacitive σ_c and inductive σ_L components

$$\sigma_x = \sigma_c + \sigma_L = \omega C - \frac{1}{\omega L}\ .$$

Eq. (2.1) can be re-written as

$$I_\Sigma = \omega C\left(1 - \frac{\omega_0^2}{\omega^2}\right)U_0 \cos \omega t\ ,$$

Where $\omega_0^2 = \dfrac{1}{LC}$ is the resonance frequency of a parallel circuit.

From the mathematical (i.e. other than physical) standpoint, we may assume a circuit that has only a capacitor and no inductance coil. Its frequency – dependent capacitance is

$$C^*(\omega) = C\left(1 - \frac{\omega_0^2}{\omega}\right) . \quad (2.2)$$

Another approach is possible, which is correct too. Eq. (2.1) can be re-written as

$$I_\Sigma = -\frac{\left(\dfrac{\omega^2}{\omega_0^2} - 1\right)}{\omega L} U_0 \cos \omega t .$$

In this case the circuit is assumed to include only an inductance coil and no capacitor. Its frequency – dependent inductance is

$$L^*(\omega) = \frac{L}{\left(\dfrac{\omega^2}{\omega_0^2} - 1\right)} . \quad (2.3)$$

Using the notion Eqs. (2.2) and (2.3), we can write

$$I_\Sigma = \omega C^*(\omega) U_0 \cos \omega t , \quad (2.4)$$

or

$$I_\Sigma = -\frac{1}{\omega L^*(\omega)} U_0 \cos \omega t . \quad (2.5)$$

Eqs (2.4) and (2.5) are equivalent and each of them provides a complete mathematical description of the circuit. From the physical point of view, $C^*(\omega)$ and $L^*(\omega)$ do not represent capacitance and inductance though they have the corresponding dimensions. Their physical sense is as follows:

$$C^*(\omega) = \frac{\sigma_X}{\omega} ,$$

i.e. $C^*(\omega)$ is the total susceptance of this circuit divided by frequency:

$$L^*(\omega) = \frac{1}{\omega \sigma_X} ,$$

and $L^*(\omega)$ is the inverse value of the product of the total susceptance and the frequency.

Amount $C^*(\omega)$ is constricted mathematically so that it includes *C* and *L* simultaneously. The same is true for $L^*(\omega)$.

We shall not consider here any other cases, e.g., series or more complex circuits. It is however important to note that applying the above method, any circuit consisting of the reactive components *C* and *L* can be described either through frequency – dependent inductance or frequency – dependent capacitance.

But this is only a mathematical description of real circuits with constant – value reactive elements.

It is well known that the energy stored in the capacitor and inductance coil can be found as

$$W_C = \frac{1}{2} C U^2 , \quad (2.6)$$

$$W_L = \frac{1}{2} L I^2 . \quad (2.7)$$

But what can be done if we have $C^*(\omega)$ and $L^*(\omega)$? There is no way of substituting them into Eqs. (2.6) and (2.7) because they can be both positive and negative. It can be shown readily that the energy stored in the circuit analyzed is

$$W_\Sigma = \frac{1}{2} \cdot \frac{d \sigma_X}{d \omega} U^2 , \quad (2.8)$$

or

$$W_\Sigma = \frac{1}{2} \cdot \frac{d\left[\omega C^*(\omega)\right]}{d \omega} U^2 , \quad (2.9)$$

or

$$W_\Sigma = \frac{1}{2} \cdot \frac{d\left(\dfrac{1}{\omega L^*(\omega)}\right)}{d \omega} U^2 . \quad (3.10)$$

Having written Eqs. (2.8), (2.9) or (2.10) in greater detail, we arrive at the same result:

$$W_\Sigma = \frac{1}{2} C U^2 + \frac{1}{2} L I^2 ,$$

Where U is the voltage at the capacitor and I is the current through the inductance coil. Below we consider the physical meaning jog the magnitudes $\varepsilon(\omega)$ and $\mu(\omega)$ for material media.

A superconductor is a perfect plasma medium in which charge carriers (electrons) can move without friction. In this case the equation of motion is

$$m\frac{d\vec{V}}{dt} = e\vec{E}, \tag{2.11}$$

Where m and e are the electron mass and charge, respectively; $\vec{E}$ is the electric field strength, $\vec{V}$ is the velocity. Taking into account the current density

$$\vec{j} = ne\vec{V}, \tag{2.12}$$

we can obtain from Eq. (2.11)

$$\vec{j}_L = \frac{ne^2}{m}\int \vec{E}\,dt \,. \tag{2.13}$$

In Eqs. (2.12) and (2.13) n is the specific charge density. Introducing the notion

$$L_k = \frac{m}{ne^2},$$

we can write

$$\vec{j}_L = \frac{1}{L_k}\int \vec{E}\,dt \,. \tag{2.14}$$

Here L_k is the kinetic inductivity of the medium [7-11]. Its existence is based on the fact that a charge carrier has a mass and hence it possesses inertia properties.

For harmonic fields we have $\vec{E} = \vec{E}_0 \sin \omega t$ and Eq. (2.14) becomes

$$\vec{j}_L = -\frac{1}{\omega L_k} E_0 \cos \omega t \,. \tag{2.15}$$

Eqs. (2.14) and (2.15) show that $\vec{j}_L$ is the current through the inductance coil.

In this case the Maxwell equations take the following form

$$rot\,\vec{E} = -\mu_0 \frac{\partial \vec{H}}{\partial t},$$

$$rot\,\vec{H} = \vec{j}_C + \vec{j}_L = \varepsilon_0 \frac{\partial \vec{E}}{\partial t} + \frac{1}{L_k}\int \vec{E}\,dt, \tag{2.16}$$

Where ε_0 and μ_0 are the electric and magnetic inductivities in vacuum, $\vec{j}_C$ and $\vec{j}_L$ are the displacement and conduction currents, respectively. As was shown above, $\vec{j}_L$ is the inductive current.

Eq. (2.16) gives

$$rot\,rot\,\vec{H} + \mu_0\varepsilon_0 \frac{\partial^2 \vec{H}}{\partial t^2} + \frac{\mu_0}{L_k}\vec{H} = 0 \,. \tag{2.17}$$

For time-independent fields, Eq. (2.17) transforms into the London equation [12]

$$rot\,rot\,\vec{H} + \frac{\mu_0}{L_k}\vec{H} = 0,$$

where $\lambda_L^2 = \dfrac{L_k}{\mu_0}$ is the London depth of penetration.

As Eq. (2.16) shows, the inductivities of plasma (both electric and magnetic) are frequency – independent and equal to the corresponding parameters for vacuum. Besides, such plasma has another fundamental material characteristic – kinetic inductivity.

Eqs. (2.16) hold for both constant and variable fields. For harmonic fields $\vec{E} = \vec{E}_0 \sin \omega t$, Eq.(2.16) gives

$$rot\,\vec{H} = \left(\varepsilon_0\omega - \frac{1}{L_k\omega}\right)\vec{E}_0 \cos \omega t \,. \tag{2.18}$$

Taking the bracketed value as the specific susceptance σ_x of plasma, we can write

$$rot\,\vec{H} = \sigma_X \vec{E}_0 \cos \omega t \,, \tag{2.19}$$

where

$$\sigma_X = \varepsilon_0\omega - \frac{1}{\omega L_k} = \varepsilon_0\omega\left(1 - \frac{\omega_\rho^2}{\omega^2}\right) = \omega\,\varepsilon^*(\omega), \tag{2.20}$$

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and $\varepsilon^*(\omega) = \varepsilon_0\left(1 - \frac{\varpi_\rho^2}{\omega}\right)$, where $\omega_\rho^2 = \frac{1}{\varepsilon_0 L_k}$

is the plasma frequency.

Now Eq. (2.19) can be re-written as

$$rot\ \vec{H} = \omega\ \varepsilon_0\left(1 - \frac{\omega_\rho^2}{\omega^2}\right)\vec{E}_0 \cos\ \omega\ t\ ,$$

or

$$rot\ \vec{H} = \omega\ \varepsilon^*(\omega)\vec{E}_0 \cos\ \omega\ t\ .$$

The $\varepsilon^*(\omega)$ –parameter is conventionally called the frequency-dependent electric inductivity of plasma. In reality however this magnitude includes simultaneously the electric inductivity of vacuum aid the kinetic inductivity of plasma. It can be found as

$$\varepsilon^*(\omega) = \frac{\sigma_X}{\omega}\ .$$

It is evident that there is another way of writing σ_X

$$\sigma_X = \varepsilon_0\varpi - \frac{1}{\omega\ L_k} = \frac{1}{\omega\ L_k}\left(\frac{\omega^2}{\omega_\rho^2} - 1\right) = \frac{1}{\omega\ L_k{}^*}, \quad (2.21)$$

where

$$L_k{}^*(\omega) = \frac{L_k}{\left(\frac{\omega^2}{\omega_\rho^2} - 1\right)} = \frac{1}{\sigma_X\omega}\ .$$

$L_k{}^*(\omega)$ written this way includes both ε_0 and L_k.

Eqs. (2.20) and (2.21) are equivalent, and it is safe to say that plasma is characterized by the frequency-dependent kinetic inductance $L_k{}^*(\omega)$ rather than by the frequency-dependent electric inductivity $\varepsilon^*(\omega)$.

Eq. (2.18) can be re-written using the parameters $\varepsilon^*(\omega)$ and $L_k{}^*(\omega)$

$$rot\ \vec{H} = \omega\ \varepsilon^*(\omega)\vec{E}_0 \cos\ \omega\ t\ , \quad (2.22)$$

or

$$rot\ \vec{H} = \frac{1}{\omega\ L_k{}^*(\omega)}\vec{E}_0 \cos\ \omega\ t\ . \quad (2.23)$$

Eqs. (2.22) and (2.23) are equivalent.

Thus, the parameter $\varepsilon^*(\omega)$ is not an electric inductivity though it has its dimensions. The same can be said about $L_k{}^*(\omega)$.

We can see readily that

$$\varepsilon^*(\omega) = \frac{\sigma_X}{\omega}\ ,$$

$$L_k{}^*(\omega) = \frac{1}{\sigma_X\omega}\ .$$

These relations describe the physical meaning of $\varepsilon^*(\omega)$ and $L_k{}^*(\omega)$.

Of course, the parameters $\varepsilon^*(\omega)$ and $L_k{}^*(\omega)$ are hardly usable for calculating energy by the following equations

$$W_E = \frac{1}{2}\varepsilon\ E_0^2$$

and

$$W_j = \frac{1}{2}L_k\ j_0^2\ .$$

For this purpose the Eq. (2.9)-type fotmula was devised in [2]:

$$W = \frac{1}{2}\cdot\frac{d\lfloor\omega\ \varepsilon^*(\omega)\rfloor}{d\ \omega}E_0^2\ . \quad (2.24)$$

Using Eq. (2.24), we can obtain

$$W_\Sigma = \frac{1}{2}\varepsilon_0 E_0^2 + \frac{1}{2}\cdot\frac{1}{\omega^2 L_k}E_0^2 = \frac{1}{2}\varepsilon_0 E_0^2 + \frac{1}{2}L_k\ j_0^2$$

The same result is obtainable from

$$W = \frac{1}{2}\cdot\frac{d\left[\frac{1}{\omega\ L_k{}^*(\omega)}\right]}{d\ \omega}E_0^2\ .$$

As in the case of a parallel circuit, either of the parameters $\varepsilon^*(\omega)$ and $L_k{}^*(\omega)$, similarly to $C^*(\omega)$ and $L^*(\omega)$, characterize completely the electro dynamic properties of plasma. The case

$$\varepsilon^*(\omega) = 0$$

$$L_k{}^*(\omega) = \infty$$

corresponds to the resonance of current.

We have found that $\varepsilon(\omega)$ is not dielectric inductivity permittivity. Instead, it includes two frequency-independent parameters ε_0 and L_k. What is the reason for the physical misunderstanding of the parameter $\varepsilon(\omega)$? This occurs first of all because for the case of plasma the $\frac{1}{L_k}\int \vec{E}\, d\, t$ - type term is not explicitly present in the second Maxwell equation.

There is however another reason for this serious mistake in the present-day physics [2] as an example. This study states that there is no difference between dielectrics and conductors at very high frequencies. On this basis the authors suggest the existence of a polarization vector in conducting media and this vector is introduced from the relation

$$\vec{P} = \Sigma\ e\ \vec{r}_m = n\ e\ \vec{r}_m\ , \qquad (2.25)$$

Where n is the charge carrier density, $\vec{r}_m$ is the current charge displacement. This approach is physically erroneous because only bound charges can polarize and form electric dipoles when the external field overcoming the attraction force of the bound charges accumulates extra electrostatic energy in the dipoles. In conductors the charges are not bound and their displacement would not produce any extra electrostatic energy. This is especially obvious if we employ the induction technique to induce current (i.e. to displace charges) in a ring conductor. In this case there is no restoring force to act upon the charges, hence, no electric polarization is possible. In [2] the polarization vector found from Eq. (2.25) is introduced into the electric induction of conducting media

$$\vec{D} = \varepsilon_0\ \vec{E} + \vec{P},$$

Where the vector $\vec{P}$ of a metal is obtained from Eq. (2.25), which is wrong.

Since

$$\vec{r}_m = -\frac{e^2}{m\ \omega^2}\vec{E}\ ,$$

for free carriers, then

$$\vec{P}*(\omega) = -\frac{n\ e^2}{m\ \omega^2}\vec{E}\ ,$$

for plasma, and

$$\vec{D}*(\omega) = \varepsilon_0\ \vec{E} + \vec{P}*(\omega) = \varepsilon_0\left(1-\frac{\omega_p^2}{\omega^2}\right)\vec{E}\ .$$

Thus, the total accumulated energy is

$$W_\Sigma = \frac{1}{2}\varepsilon_0\ E^2 + \frac{1}{2}\cdot\frac{1}{L_k\ \omega^2}E^2\ . \qquad (2.26)$$

However, the second term in the right-hand side of Eq. (2.26) is the kinetic energy (in contrast to dielectrics for which this term is the potential energy). Hence, the electric induction vector $D*(\omega)$ does not correspond to the physical definition of the electric induction vector.

The physical meaning of the introduced vector $\vec{P}*(\omega)$ is clear from

$$\vec{P}*(\omega) = \frac{\sigma_L}{\omega}\vec{E} = \frac{1}{L_k\ \omega^2}\vec{E}\ .$$

The interpretation of $\varepsilon(\omega)$ as frequency-dependent inductivity has been harmful for correct understanding of the real physical picture (especially in the educational processes). Besides, it has drawn away the researchers attention from some physical phenomena in plasma, which first of all include the transverse plasma resonance and three energy components of the magneto electro kinetic wave propagating in plasma [13-14].

III. Dielectric Media

Applied fields cause polarization of bound charges in dielectrics. The polarization takes some energy from the field source, and the dielectric accumulates extra electrostatic energy. The extent of displacement of the polarized charges from the equilibrium is dependent on the electric field and the coefficient of elasticity β, characterizing the elasticity of the charge bonds. These parameters are related as

$$-\omega^2\ \vec{r}_m + \frac{\beta}{m}\vec{r}_m = \frac{e}{m}\vec{E}, \qquad (3.1)$$

Where $\vec{r}_m$ is the charge displacement from the equilibrium.

Putting ω_0 for the resonance frequency of the bound charges and taking into account that $\omega_0 = \beta/m$ we obtain from Eq. (3.1)

$$\vec{r}_m = -\frac{e\vec{E}}{m\ (\omega^2\ - \omega_o^2)}$$

The polarization vector becomes

$$\vec{P}_m * = -\frac{n\ e^2}{m}\cdot\frac{1}{(\omega^2 - \omega_0^2)}\vec{E}.$$

Since

$$\vec{P} = \varepsilon_0 \ (\varepsilon - 1) \ \vec{E},$$

we obtain

$$\varepsilon'_{\partial} \ *(\omega) = 1 - \frac{n \ e^2}{\varepsilon_0 \ m} \cdot \frac{1}{\omega^2 - \omega_0^2}.$$

The quantity $\varepsilon'_{\partial} *(\omega)$ is commonly called the relative frequency dependably electric inductivity. Its absolute value can be found as

$$\varepsilon_{\partial} *(\omega) = \varepsilon_0 (1 - \frac{n \ e^2}{\varepsilon_0 m} \cdot \frac{1}{\omega^2 - \omega_0^2}). \qquad (3.2)$$

Once again, we arrive at the frequency-dependent dielectric permitlivity. Let us take a closer look at the quantity $\varepsilon_{\partial} *(\omega)$. As before, we introduce $L_{k \ \partial} = \frac{m}{n \ e^2}$ and $\omega_{p.\partial} = \frac{1}{L_{k \ \partial} \varepsilon_0}$ and see immediately that the vibrating charges of the dielectric have masses and thus possess inertia properties. As a result, their kinetic inductivity would make itself evident too. Eq. (3.2) can be re-written as

$$\varepsilon_{\partial} *(\omega) = \varepsilon_0 (1 - \frac{\omega_{p \ \partial}^2}{\omega^2 - \omega_0^2}).$$

It is appropriate to examine two limiting cases: $\omega >> \omega_0$ and $\omega << \omega_0$.

If $\omega >> \omega_0$,

$$\varepsilon_{\partial} *(\omega) = \varepsilon_0 (1 - \frac{\omega_{p \ \partial}^2}{\omega^2}) \ ,$$

$$\mu_T *(\omega) = 1 - \frac{\Omega \ |\gamma| \ M_0}{\mu_0 (\omega^2 - \Omega^2)},$$

and the dielectric behaves just like plasma. This case has prompted the idea that at high frequencies there is no difference between dielectrics and plasma. The idea served as a basis for introducing the polarization vector in conductors [2]. The difference however exists and it is of fundamental importance. In dielectrics, because of inertia, the amplitude of charge vibrations is very small at high frequencies and so is the polarization vector. The polarization vector is always zero in conductors.

For $\omega << \omega_0$,

$$\varepsilon_{\partial} *(\omega) = \varepsilon_0 (1 + \frac{\omega_{p \ \partial}^2}{\omega_0^2}) \ ,$$

and the permittivity of the dielectric is independent of frequency. It is $(1 + \frac{\omega_{p \ \partial}^2}{\omega_0^2})$ times higher than in vacuum. This result is quite clear. At $\omega >> \omega_0$ the inertia properties areinactive and permittivity approaches its value in the static field.

IV. Magnetic Media

The resonance phenomena in plasma and dielectrics are characterized by repeated electrostatic-kinetic and kinetic-electrostatic transformations of the charge motion energy during oscillations. This can be described as an electrokinetic process, and devices based on it (lasers, masers, filters, etc.) can be classified as electrokinetic units.

However, another type of resonance is also possible, namely, magnetic resonance. Within the current concepts of frequency-dependent permeability, it is easy to show that such dependence is related to magnetic resonance. For example, let us consider ferromagnetic resonance. A ferrite magnetized by applying a stationary field H_0 parallel to the z-axis will act as an anisotropic magnet in relation to the variable external field. The complex permeability of this medium has the form of a tensor [15]:

$$\mu = \begin{pmatrix} \mu_T *(\omega) & -i \ \alpha & 0 \\ i \ \alpha & \mu_T *(\omega) & 0 \\ 0 & 0 & \mu_L \end{pmatrix} ,$$

where

$$\alpha = \frac{\omega \ |\gamma| \ M_0}{\mu_0 (\omega^2 - \Omega^2)}, \qquad \mu_L = 1,$$

$$\Omega = |\gamma| H_0. \qquad (4.1)$$

Being the natural professional frequency, and

$$M_0 = \mu_0 (\mu - 1) H_0 \qquad (4.2)$$

is the medium magnetization.

Taking into account Eqs. (4.1) and (4.2) for $\mu_T *(\omega)$, we can write

$$\mu_T *(\omega) = 1 - \frac{\Omega^2 (\mu - 1)}{\omega^2 - \Omega^2} \ . \qquad (4.3)$$

Assuming that the electromagnetic wave propagates along the x-axis and there are H_y and H_z components, the first Max well equation becomes

$$rot \ \vec{E} = \frac{\partial \ \vec{E}_Z}{\partial \ x} = \mu_0 \mu_T \frac{\partial \ \vec{H}_y}{\partial \ t} \ .$$

Taking into account Eq. (4.3), we obtain

$$rot\ \vec{E} = \mu_0\left[1-\frac{\Omega^2(\mu-1)}{\omega^2-\Omega^2}\right]\frac{\partial\,\vec{H}_y}{\partial\,t}\ .$$

For ω>>Ω

$$rot\ \vec{E} = \mu_0\left[1-\frac{\Omega^2(\mu-1)}{\omega^2}\right]\frac{\partial\,\vec{H}_y}{\partial\,t}\ . \qquad (4.4)$$

Assumeng $\vec{H}_y = \vec{H}_{y0}\ sin\omega t$ and taking into account that

$$\frac{\partial\,\vec{H}_y}{\partial\,t} = -\omega^2\int \vec{H}_y\,d\,t\ .$$

Eq. (4.4) gives

$$rot\ \vec{E} = \mu_0\frac{\partial\,\vec{H}_y}{\partial\,t} + \mu_0\,\Omega^2(\mu-1)\int \vec{H}_y\,d\,t\ ,$$

or

$$rot\ \vec{E} = \mu_0\frac{\partial\,\vec{H}_y}{\partial\,t} + \frac{1}{C_k}\int \vec{H}_y\,d\,t\ .$$

For ω<<Ω

$$rot\ \vec{E} = \mu_0\mu\frac{\partial\,\vec{H}_y}{\partial\,t}\ .$$

The quantity

$$C_k = \frac{1}{\mu_0\,\Omega^2(\mu-1)}$$

can be described as kinetic capacitance[16-17]. What is its physical meaning? If the direction of the magnetic moment does not coincide with that of the external magnetic field, the vector of the moment starts precessional motion at the frequency Ω about the magnetic field vector. The magnetic moment $\vec{m}$ has the potential energy $U_m = -\vec{m}\cdot\vec{B}$. Like in a charged condenser, U_m is the potential energy because the precessional motion is inertia less (even though it is mechanical) and it stops immediately when the magnetic field is lifted. In the magnetic field the processional motion lasts until the accumulated potential energy is exhausted and the vector of the magnetic moment becomes parallel to the vector $\vec{H}_0$.

Magnetic resonance occurs at the point ω=Ω and $\mu_T*(\omega)\to-\infty$. It is seen that the resonance frequency of the macroscopic magnetic resonator is independent of the line size and equals Ω.

Thus, the parameter

$$\mu_H*(\omega) = \mu_0\left[1-\frac{\Omega^2(\mu-1)}{\omega^2-\Omega^2}\right]$$

is not a frequency-dependent permeability.

V. Conclusion

Thus, it has been found that along with the fundamental parameters $\varepsilon\varepsilon_0$ and $\mu\mu_0$ characterizing the electric and magnetic energy accumulated and transferred in the medium, there are two more basic material parameters L_k and C_k. They characterize kinetic and potential energy that can be accumulated and transferred in material media. L_k was sometimes used to describe certain physical phenomena, for example, in super conductors, C_k has never been known to exist. These four fundamental parameters $\varepsilon\varepsilon_0$, $\mu\mu_0$, L_k and C_k clarify the physical picture of the wave and resonance processes in material media in applied electromagnetic fields. Previously, only electromagnetic waves were thought to propagate and transfer energy in material media. It is clear now that the concept was not complete. In fact, magneto electro kinetic, or electro magneto potential waves travel in material media. The resonances in these media also have specific features. Unlike closed planes with electromagnetic resonance and energy exchange between electric and magnetic fields, material media have two types of resonance – electro kinetic and magneto potential. Under the electro kinetic resonsnce the energy of the electric field changes to kinetic energy. In the case of magneto potential resonance the potential energy accumulated during the precessional motion can escape outside at the precession frequency.

The notions of permittivity and permeability dispersion thus become physically groundless though ε*(ω) and μ*(ω) are handy for a mathematical description of the processes in material media. We should however remember their true meaning especially where educational processes are involved.

It is surprising that Eq. (3.29) actually accounts for the whole of electrodynamics beause all current electrodynamics problems can be solved using this equation. What is then a magnetic field? This is merely a convenient mathematical procedure which is not necessarily gives a correct result (e.g., in the case of parallel-moving charges). Now we can state that electrocurrent, rather than electromagnetic, waves travel in space. Their electric field and displacement current vectors are in the same plane and displaced by π/2.

Any theory is dead unless important practical results are obtained of its basis. The use of the previously unknown transverse plasma resonance [14] is one of the most important practical results following from this study.

References Références Referencias

1. A.F. Aleksandrov, L.S. Bogdankevich, A.A. Rukhdze, *Oscillations and waves in plasma media,* Moscow University Publishers, 1990.
2. L.D. Landau, E.M. Lifshits, *Electrodynamics of continuous media*. Moscow, 1973.
3. V. L. Ginzburg, The propagation of electro magnetic waves in a plasma. - M .:Science,1967.
4. A. I. Akhiezer. *Plasma Physics Nauka*, Moscow, 1974.
5. I.E.Tamm*Fundamentals ofthe theory of electricity*, M.:Science, 1989.
6. F. F. Mende On refinement of certain laws of classical electrodynamics, arXiv, physics/0402084.
7. F.F. Mende, A.I. Spitsyn, *Surface impedance in superconductors*, Kiev, Naukova Dumka 1985.
8. F. F. Mende, On refinement of equations of electromagnetic induction, – Kharkov, deposited in VINITI, No 774 – B88 Dep. 1988.
9. F. F. Mende, Origin of the new alternative electrodynamics, Preprint, Research Institute forCryogenic Instrument Engineering Minor State Enterprise at Institute for Low Temperature Physics and Engineering, Acad. Sci. Ukraine, No. 2.1993.
10. F.F. Mende, On refinement of equations of electromagnetic induction,–Kharkov, deposited in VINITI, No 774 – B88 Dep. 1988.
11. F. F. Mende. Role and place of the kinetic inductance of charges in classical electrodynamics, Engineering Physics, №11, 2012.
12. F. London, *Superfluids. Microscopic theory of superconductivity* Vol.1, Nev York: Dower publ., 1950.
13. F. F. Mende, Conception of the scalar-vector potential in contemporary electrodynamics, arXiv.org/abs/physics/0506083.
14. F. F. Mende, Transversal plasma resonance in a non magnetized plasma and possibilities of practical employment of it. arXiv.org/abs/-physics//0506081.
15. V. V. Nicolsky, T.I. Nicolskaya, *Electrodynamics and propagation of radio waves*, Moscow, Nauka 1989.
16. F. F. Mende, New approachesin contemporary classical electrodynamics. Part I, Engineering Physics, №1, 2013.
17. F. F. Mende, New approaches in contemporary classical electrodynamics. Part II, Engineering Physics, №2, 2013.

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Passenger Safe Car

By D. Giftson Felix & P. Mohan Kumar
Panimalar Engineering College, India

Abstract- In today's world there are more and more cars in the road. For the past few years the amount of automobiles in the road has been increased at the same time number of accidents is also increased. We cannot blame anyone for buying a car it's their wish. Now-a-days many automobile companies are manufacturing cars with high safety for passengers by placing front and side air bag but all these prevent him from a major accident. During accident the injuries to the passenger especially to the driver are caused only by the place where he sits (I.e.) due to the steering column. Hence apart from air bags this idea moves the passenger's seat little backwards so that they move away from the accident zone hence injuries can be reduced. This is done by the use of two master cylinders and two slave cylinders.

Keywords: master cylinder, slave cylinder, base plate.

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PASSENGERSAFECAR

Strictly as per the compliance and regulations of:

Passenger Safe Car

D. Giftson Felix [α] & P. Mohan Kumar [σ]

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Keywords: *master cylinder, slave cylinder, base plate.*

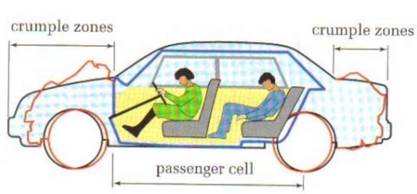
I. Introduction

Today the number of cars has been increased due to the congestion many accidents occur here and there and many lose their life in this. To overcome this many automobiles are now assisted with air bags, anti lock system, etc. yes, this prevents but it does not moves the passenger from things which hit them especially steering column, Dash board, etc. Hence in this idea the passenger seat itself moves so that injuries are reduced. This in turn saves many lives.

a) Disadvantages of previous improvements

i. *Crumple Zones*

- Passengers are still at risk due to the small distance of the car moving even after the crumple zone acts.
- Crumple zones can cause glass to shatter which can cause more injury to the passenger.

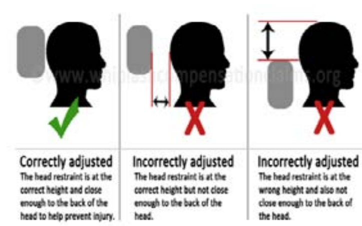


ii. *Air Bags*

- The impact of an airbag can hurt a passenger who is improperly positioned.
- Injuries from airbags include chest injuries, concussions and whiplash.

iii. *Head Rests*

- It should be in position to prevent whiplash the head rest should be at least as high as the head's centre of gravity (eye level and higher) and as close to the back of the head as possible.
- But we adjust it often for our comfort and now-a-days TV is fitted in it so the position is completely altered.



II. Components Present

MASTER CYLINDER

SLAVE CYLINDER

FLEXIBLE HOSE

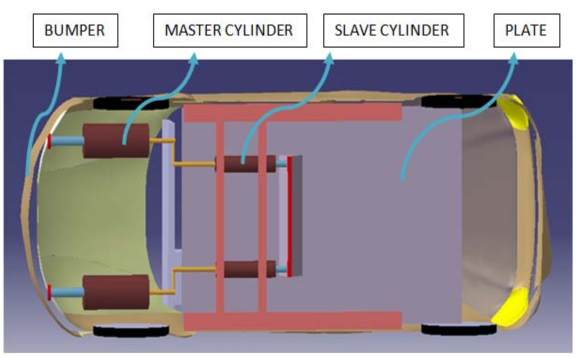
Author α σ: Department of Mechanical Engineering, Panimalar Engineering College, Chennai-123. e-mail: giftsonfelix191@gmail.com

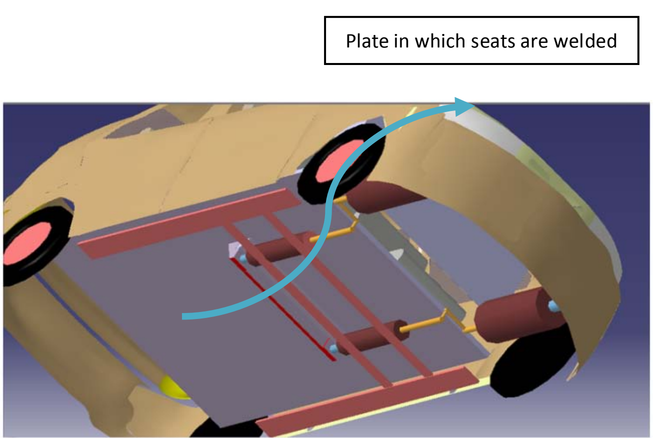
III. Principle behind our Idea

The working principle of the idea presented in this paper is when a speeding car hits an object or another vehicle the very first part which hits is the bumper hence behind this there will be a master cylinder which has a piston rod in the extended form so that as soon as the car hits the object the bumper presses the piston rod so inside so that the fluid inside it gets compressed and moves to actuate the slave cylinder, this slave cylinder has a piston rod attached to the passenger seats assembly so that it moves backwards thus the injuries during the accident can be minimized.

IV. Construction

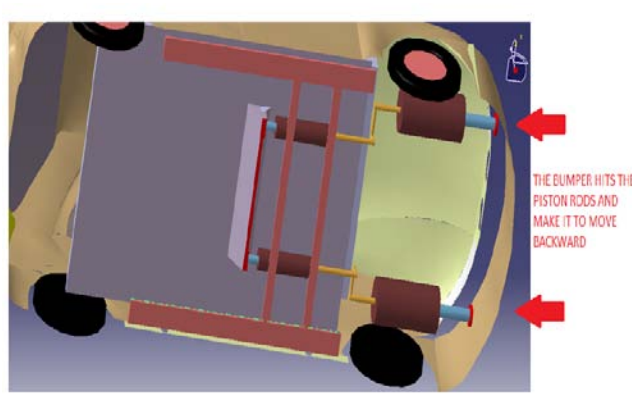
The construction of this idea is very simple the passenger seats are welded or joined to a movable plate which moves on a sliding bearing. The master cylinder is placed at the front end at the backside of the bumper so that during collision the bumper touches the master cylinders piston rod. Then the plate in which the passenger seats are welded (or) joined is attached to the piston rod of the slave cylinder. Then the both cylinders are joined by means of flexible hosing or by a solid one with a check valve in it so that it allows the fluid in only one direction. To the same hosing after the check valve a variable orifice is attached so that the fluid returns at slow speed.



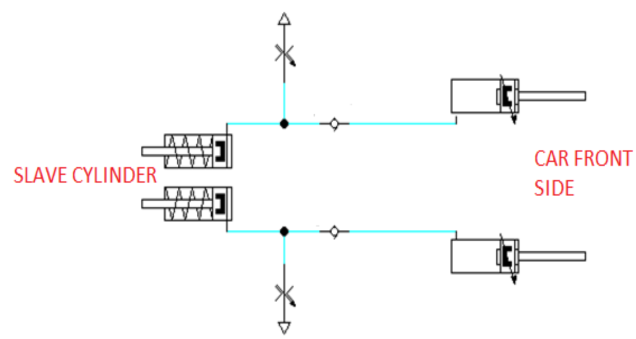


V. Working

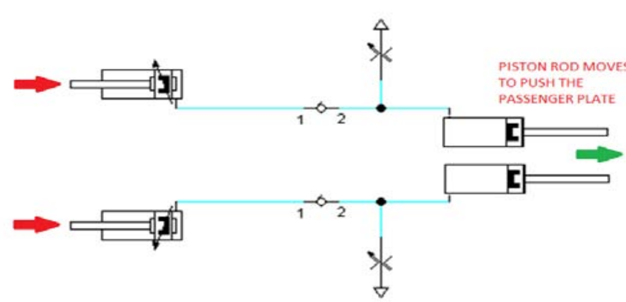
- ✓ When the car hits an object or another car bumper is the first part which faces the collision.
- ✓ As soon as it hits the bumper deforms inside so that it pushes the piston rod of the master cylinder.



- ✓ Below diagram shows the circuit of the above diagram.

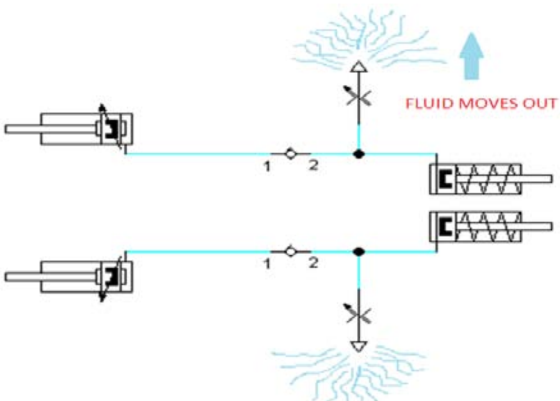


- ✓ When the piston rod of the master cylinder moves it compresses the fluid which is present inside the cylinder so that it sends the fluid to the slave cylinder.
- ✓ Due to the pressure of the fluid it pushes the slave cylinders piston rod.

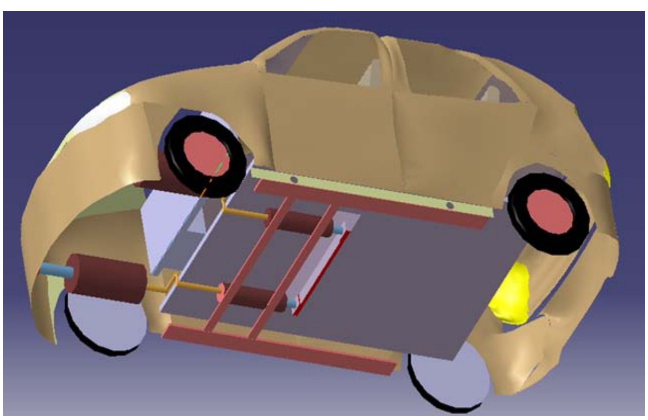


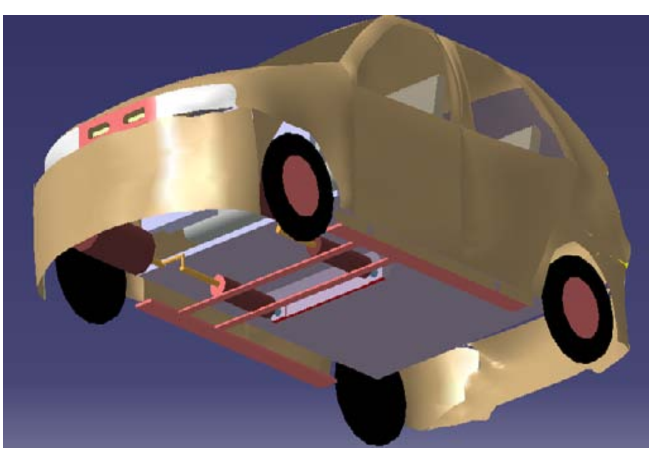
- ✓ Thus the plate in which the passenger seat is welded or joined moves backward and so the passenger especially the driver moves away and avoids major injuries like finger, hands fractures, etc.

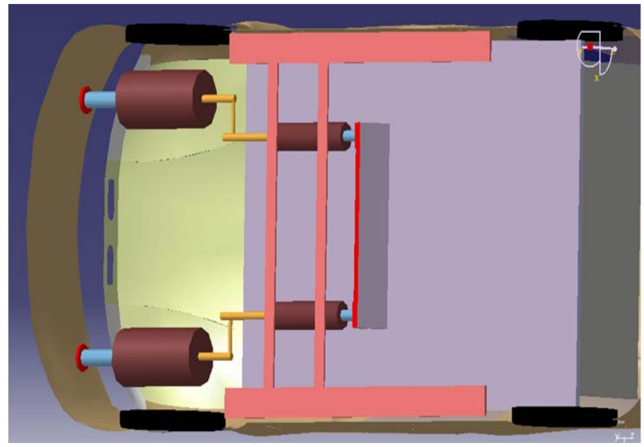
- ✓ During minor collisions also this process takes place but this has to be recovered (I.e.) the plate should again come to its original position so that the driver can drive away during minor accidents. For this process to occur a check valve is provided the single acting cylinder is spring return one so its moves to its original position automatically.
- ✓ But the return stroke must be at very low speed hence the fluid is bypassed through a variable orifice valve it allows a very small amount of fluid to move out so the return stroke is achieved at very slow speed.

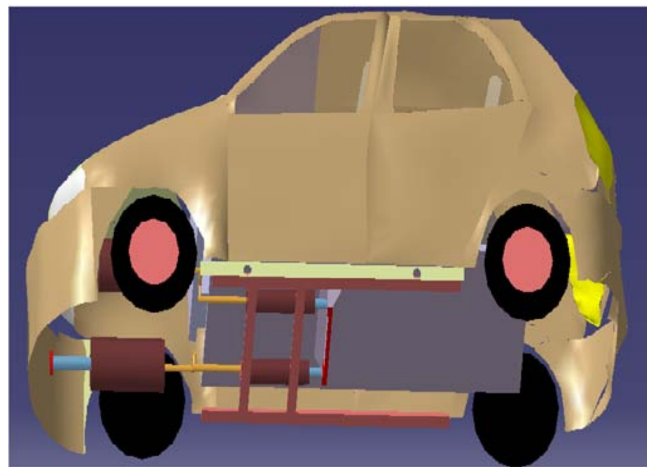


VI. Other Images









a) Advantages of this idea

- ✓ Prevents the injury to the passenger by 80%
- ✓ Simpler process
- ✓ Easy construction and assembly
- ✓ Process is quite cheap

b) Disadvantages of this idea

- ✓ The fluid pressure must be checked frequently
- ✓ May result in vibration

VII. Conclusion

On the way of many improvements to increase the safety of passengers now we have found a new way to reduce the injuries caused during accidents. By implementing this idea in the automobiles will be very useful and so the loss of lives can be somehow prevented.

VIII. Acknowledgement

I am using this opportunity to express my gratitude to everyone who supported me throughout the paper. I am thankful for their aspiring guidance, invaluably constructive criticism and friendly advice during the process. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the idea. First of all we express our sincere thanks to *Dr. P. CHINNA DURAI,* The secretary and correspondent, for having given us the consent to initiate the work. In addition to that we express our thanks to *Dr. K. MANI*, Principal, for his sincere supervision. We wish to express our deep sense of gratitude to *Dr. L. KARTHIKEYAN*, HEAD OF THE DEPARTMENT [mechanical] for his able guidance throughout this paper.

References Références Referencias

1. http://www.howsafeisyourcar.com.au/SafetyFeatures/Crash-Protection-Features/
2. http://jalopnik.com/the-ten-most-important-safety-advancements-in-automotiv-1462200446
3. http://hamptonroads.com/2013/04/auto-safety-advances-through-decades

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Impact of the Smart Textile on the High Level Sport Performance and Patient Behavior in Medicine

By R. Taiar
Université de Reims, France

Abstract- In the present study we developed several proto types which will be intended for the high level sport performance like swimming, triathlon, skiing and medicine. 6 innovative fabric proto types where developed in the aim to answer to the exigencies of the high level sport and medicine. We opted for the high-tech polyamide fiber; in the production of the textile. These innovative processes will be adapted for medical use. The medical example relates the contribution of fabrics in helping hemiplegic patients float on the water's surface. This water rehabilitation will help decrease scabs on hemiplegics by reducing the contact between the body and the wheelchair for instance. Physicochemical analysis has been done for the comparison of the different simple. No significant difference where observed between the textiles in static and dynamic behavior ($P>0.05$). In the future work the solution that we consider rests on the implementation of a data-processing platform of virtual prototyping in order to simulate all the stages of clothes industry and to lead to the most powerful model of textile specification within times much shorter. CFD (Computational Fluid Dynamics) and human modelization were used for the simulation and where compared to the experimental data for the validation.

Keywords: wettability, static impact angle, dynamic impact angle, textiles, biomechanics.

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Keywords: wettability, static impact angle, dynamic impact angle, textiles, biomechanics.

I. Introduction

The textile fibers are of vegetable origin, animal, mineral or chemical (artificial or synthetic). The synthetic fibers or yarns are realized from polymers obtained by synthesis of chemical compounds. The artificial fibers are manufactured, inter alia, starting from regenerated cellulose. The textile innovation in high level sport is characterized by the performance, the functionality, comfort, the fashion and aesthetics. The requirements of the sports activities direct industrials towards several optimizations, such as the reduction of friction, the thermoregulation improvement, the mechanical resistance, the safety, and the reduction in perspiration. In the medical environment, a technological development was observed during the ten last years. Based on their barrier effect, at their capacity of absorption, their biocompatibility and their contention capacity, the technical textiles manage to answer multiple features in this sector. For example, the introduction of hydrophilic polymers made it possible to produce perfectly adhesive bandages. The arrival of certain elastanes and the improvement of a new method of knitting permitted the production of special compression stockings that are pleasant to carry. The development of biocompatible polymeric fibers made possible the use of the textiles in the osteosynthesis prostheses or in vascular surgery. The textile developments today concern not only the imitation of natural fibers, but also the envelopment of new materials that adapt and react to the sensory and body conditions-the clothes we will use in the future will seem like second skin. After breathing fibers, the smart textile fibers adapt to the biological environment of the body. Reference [1] used the microcapsules in the t-shirt and the socks. Several laboratories work on textiles using of the microcapsules containing of the substances with phase shift [2], [3]. The fabrics of Nylon and Lycra, coated with a conducting polymer (polypyrrole) conform to the shape of the human body [4], and function ideally as the biomechanical sensors which can be used in a range of applications to control the human movement. References [5], [6] studied the intrinsic electronic conducting polymers and the installation of the methods of manufacturing of conducting textile fibers. In medicine, 10% of the world technical textile volume are employed for health and can be improved with different technical future textile utilizations [7]. Currently, the smart textiles with integrated sensors are used in the medical field [8]. The new generation of biomedical sensors provides the opportunity for monitoring continually, ambulatory, as well as in residential environments. This generates complete information and allows for improvement of prevention, as well as treatment. Applications of the system "Sensate Liner" are intended for the medical supervision. This program develops and shows useful technologies to apply a systematic approach, making it possible to supervise the medical state of the patients, with a uniform equipped with sensors [8]. Current and future potential applications of three-dimensional polymeric reinforced fabrics manufactured by the processes: weaving, braiding, pricking and knitting, are studied [9]. [10; 11] showed the preliminary results of the application of the textile in the high level sport and medicine. The aim of our study is to show our last textiles development for the high level sport and medicine. The concerns of the present study include swimming, triathlon and skiing

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textiles for sports, and textile used for hemiplegic rehabilitation patients. Different engineering methods where used for the simulation, modelization and optimization fabrics.

II. Material and Methods

a) Fabric

We developed 6 innovative fabric prototypes to answer to the exigencies of the high level athletes in swimming and Triathlon in term of increasing performance and hemiplegic patients in terms of rehabilitation. The objective is to develop a hydrophobic textile in the aim to decrease the interaction between the drop and the fibers. We opted for the high-tech polyamide fiber and elastanes, in the production of the textile Figure 1. The low density of the fibers makes it possible to produce a very lightweight fabric. The textile absorbs an extremely small amount of moisture, which means that the material cannot become saturated, hence slowing the swimmer down. When wet, polyamide fibers are almost as strong as when they are dry.

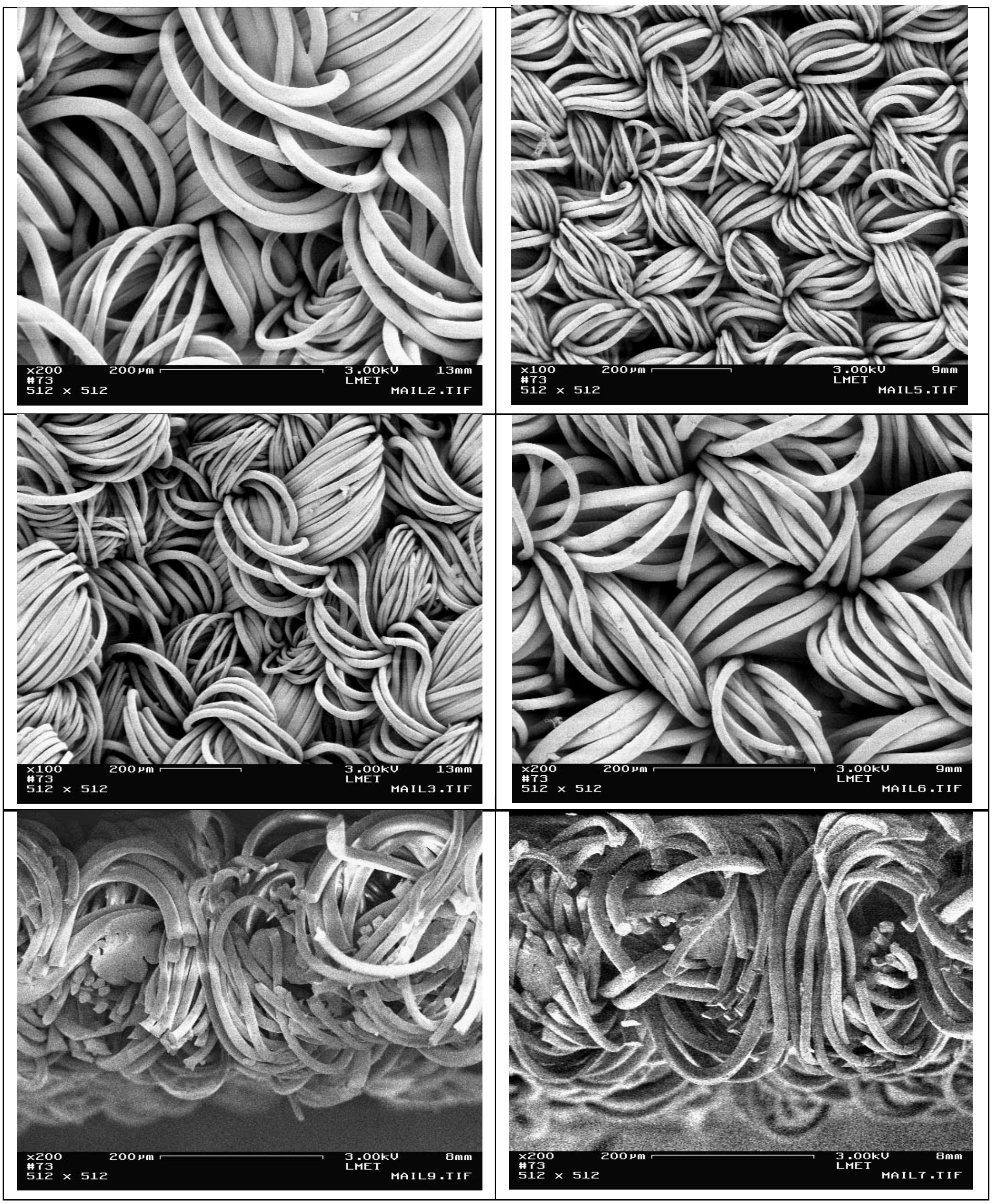

Figure 1 : Scanning Electron Microscopy SEM for the 6 polyamide fibers developed. The pictures obtained are in expansion x 100 and 200

b) In static mode study: Contact angle and disconnecting liquid drop measurements

Static contact angles were measured with a GBX Digidrop apparatus fitted to a tiltable sample carrier supported by an x-y adjustable stage (Figure 2). This sample carrier was capable of a full of 360° rotation. Video cameras with a light source permit the view of the liquid drop. A schematic description of this apparatus is presented in figure below. A finite drop volume of liquid was deposited on the horizontal substrate using a micro syringe. The contact angle is given as a function of time. Contact angle calculation was performed with the GBX scientific instrumentation software. This program allows a 50 image per second's analysis. Image of both side of the drop was captured on a computer. Then the boundary of the drop was analyzed and contact angles were calculated. An equilibrium contact angle is determined when the drop reaches a metastable equilibrium. All equilibrium contact angles measurements were performed with 5µl drops. A minimum of ten measurements are often made and the numbers averaged. A minimum drop volume is predicted for the critical inclined plane conditions. A 15µl liquid drop is retained for this experiment, and after drop deposition the plane was slowly tilted. The experimental configuration meant that the camera, light source, and substrate rotated in synchro which made it easier to detect initial drop movement. Just before the drop began to move, the receding contact angle, the advancing contact angle and the critical angle of tilt were recorded. Ten measurements were done for each result.

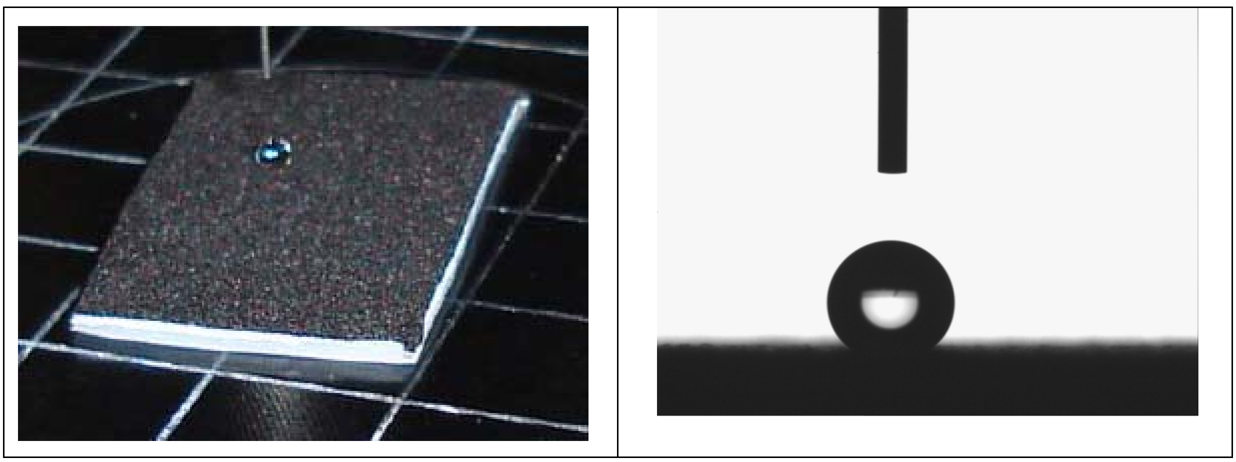

Figure 2 : GBX Digidrop destined for the measure of the contact angle of different material

c) Experience in dynamic mode: method of Wilhelmy

The dynamic advancing and dynamic receding contact angles of water on the swimsuit sample were measured by the Wilhelmy plaque method with K12 Krüss tensiometer. A schematic description of this apparatus is presented in figure below. To begin the measurements, the sample suspended with the bottom edge nearly touching the surface of the liquid. This is the position of the zero force. The sample is lowered until it touches the liquid. This is the zero position. The force on the sample is measured as it is cycled slowly down and up. The depth of immersion of the sample is chosen to 15 mm and the rate of immersion and withdrawal cycles is fixed to 3 mm/min. The waiting time at the returned point is 10 seconds. For a swimsuit sample given, when the immersion and withdrawal cycle is terminated the sample is replaced by another dry sample and the wetting cycle is repeated. Three cycles are repeated in that way. The analysis of these curves allows determining the angles of dynamic impact (angles of impact forward and backward).In dynamic conditions the name of hysteresis is used. He is defined as the difference between the minimum of the values of contact angle measured, so called receding contact angle (θr), and the maximum of the values of contact angle measured, so called advancing contact angle (θa). In dynamic, we push the fabricforward we calculate the contact angle and after the same in a backward (Figure 3).

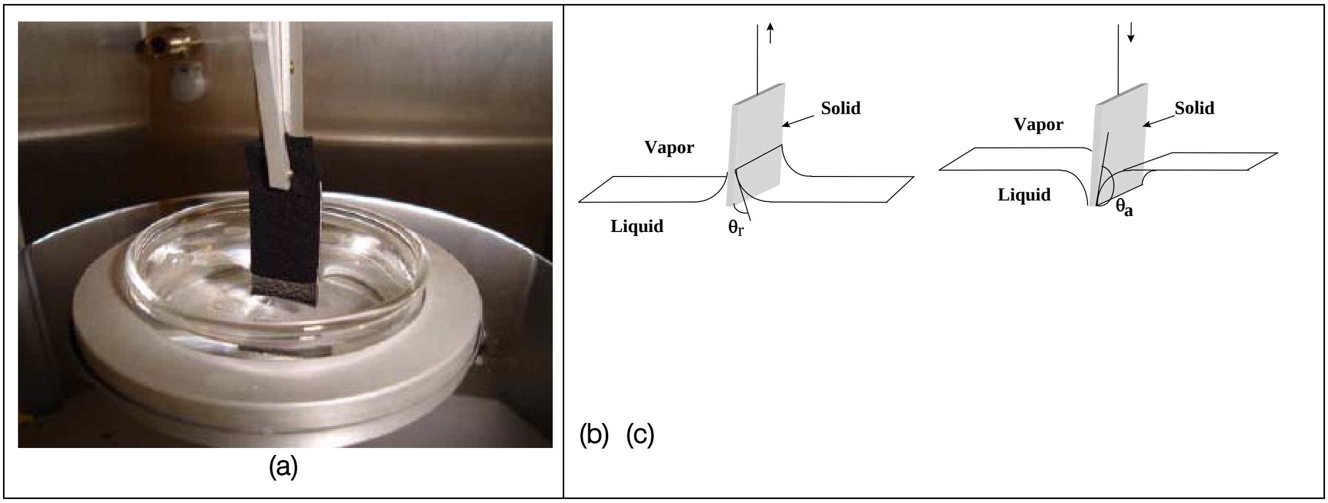

Figure 3 : Illustration of the Wilhelmy plate method in (a), Withdrawal cycle in (b) and Immersion cycle in (c)

III. Results and Discussion

Different tests were used in the aim to quantify the interaction between the water drop and the fabric. These tests were allowed to study hydrophobicity of the fabric. If the fabric is hydrophobic the materials remain dry and don't get wet. Contrary, if the fabric is hydrophilic the materiel wet. In this experimentation 6 fabrics have been studied in static (Figure 4) and dynamic conditions (Figure 5). In the figure 4 we can observe the behavior of the drop on the textile. The textile stay hydrophobic in (c) and for another simple (d) the textile absorb the drop and become hydrophilic. In figure 5 the kinetic of the textile behavior during the immersion and immersion phases.

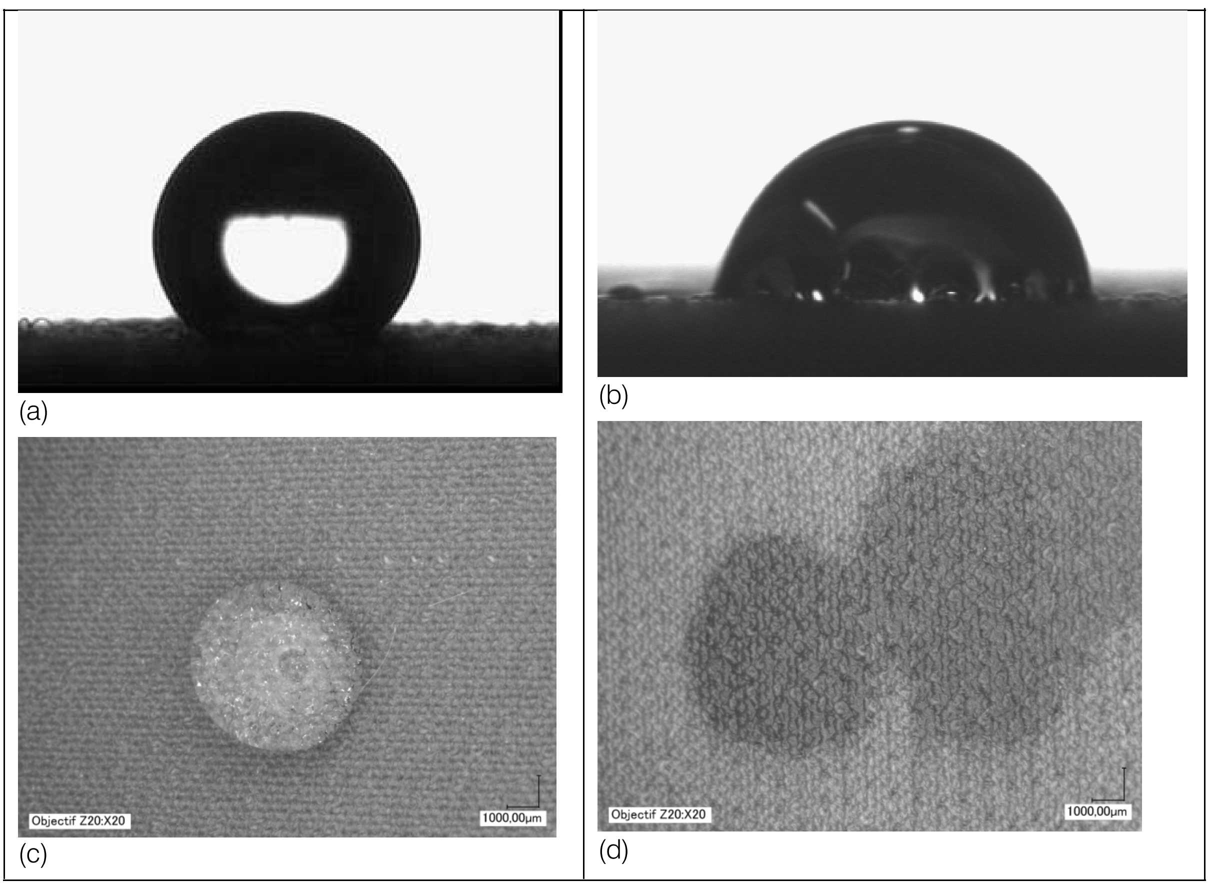

Figure 4 : static drop behavior on the fabric: hydrophobic material in (a) and hydrophilic material in (b). In (c) the behavior of the drop on textile and his absorption in (c)

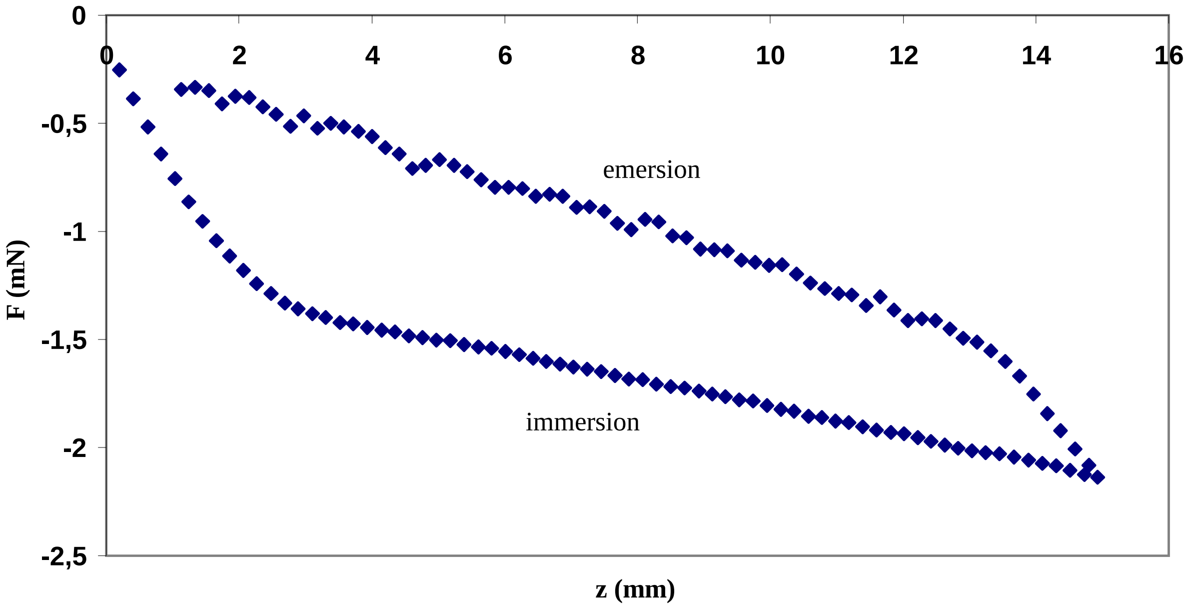

Figure 5 : dynamic drop behavior on the fabric (hysteresis). The material stays hydrophobic during the both phase's emersion and immersion (Wilhelmy plate method)

Our Results showed the hydrophobic characteristics of all the fabrics. In static and dynamic, the angles achieved are close for all the fabrics we studied. They are hydrophobic and stay dry during the experimentation. Like mentioned above the objective was to develop a hydrophobic textile in the aim to decrease the interaction between the drop and the different fabrics. The Table 1 summarizes the different values of the static and dynamic angles that we obtained.

Table 1 : static and dynamic behaviors of the different textiles

Fabric	θ_E *static*	θ_A *dynamic*	θ_R *dynamic*	$\theta_A - \theta_R$ *hystérésis*	% diff between static and dynamic teta E and teta A
Textile 1	142°	141°	~ 107°	~ 34°	0,70
Textile 2	140°	136°	~ 117°	~ 19°	2,86
Textile 3	141,5°	132°	~ 109°	~ 23°	6,71
Textile 4	141	139°	~ 90°	~ 49°	1,42
Textile 5	141,5°	132°	~ 108°	~ 24°	6,71
Textile 6	141	133°	~108	~25°	7,13

In the static conditions the angle values are very close numerically to each other (between 140° and 142° in average). The high angle values indicated the hydrophobic characteristics of the different textiles tested. In static the drop maintained its morphology for a long time. The results for the textile behavior stay hydrophobic and remain dry. In dynamic mode, the values for the forward angles are equally close, between 132° and 141°. But, for the backwards contact angle the difference between fabrics is more significant (between 90° and 117°). In dynamic, during the fabric entry into the water the force necessary is more beneficial when the textile is hydrophobic. For the results, the drop doesn't glue to the fabric decreasing, friction and the boundary layer. We noted for both measurements, static and dynamic, that the fabrics stay dry during the experimentations. The hysteresis corresponding to the difference between the forward angle and the backward angle indicated that the fabrics present hydrophobic behavior. It was weakest for the fabricT2 and strongest for the fabric T4 and can be due to the roughness, or to the heterogeneity of the surface. No significant difference was obtained in comparison of the hysteresis of the fabrics in dynamics and static ($p>0.05$). In the present study we developed several prototypes which will be intended for high level sport performance like swimming and the triathlon. These innovative processes will be adapted for medical use. The medical example relates the contribution of fabrics in helping hemiplegic patients float on the water's surface. This water rehabilitation will help decrease scabs on hemiplegics by reducing the contact between the body and the wheelchair. The figure 5 showed our first modelization of the wheelchair patient position (a)[12; 13], swimming CAD analysis (b) [14]and skiing in (c).

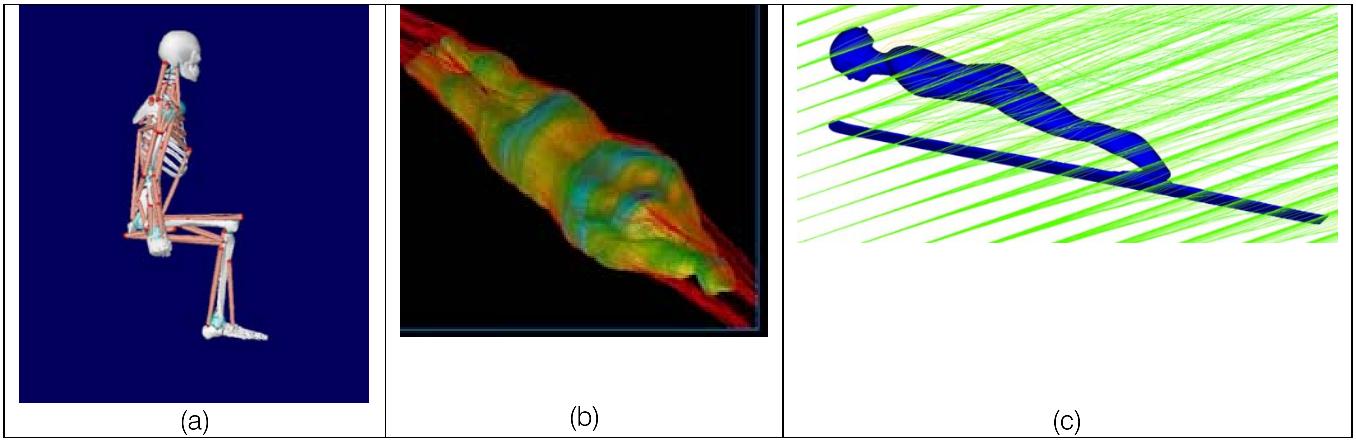

Figure 5 : Modelization and simulation of the body behavior in the different aims of our study: in (a) modelization and simulation of the wheelchair position, in (b) and (c) the swimming and triathlon simulation and skiing in (c)

IV. Conclusion

The solutions for medical and sports needs will increasingly take into account mechanical human specifications. In sports, performance improvement in the great events such as the Olympic Games is tributary in part by these textile technologies. They will find their contribution in the amelioration of muscular work, the reduction of hydrodynamical and aerodynamical resistance. In medicine, the advanced textiles will permit the development of assistance solutions tools for patient function, such as passive or active resistance. Our future work will permit to present the results after the experimentation on patients' utilization.

References Références Referencias

1. N. Gordon, "Application of microencapsulation in textiles" *Journal International of Pharmaceutics* vol 242, 2002, pp.55–62.
2. N. Sarier, E. Onder, "The manufacture of microencapsulated phase change materials suitable for the design of thermally enhanced fabrics" *Thermochimica Acta,* vol. 452, Issue 2 , 2007, pp.149-160.
3. B. Ying, Y. Kwok, Y. Li, Q. Zhu, C. Yeung, "Assessing the performance of textiles incorporating phase change materials"*Polymer Testing* vol23 , 2004, pp.541–549.
4. J. Wu, D. Zhou, C.O. Too, G.G. Wallace, "Conducting polymer coated lycra"*Synthetic Metals* vol155, 2005, pp.698–701.
5. B. Kim, V. Koncar, C. Dufour, "Polyaniline-Coated PET Conductive Yarns: Study of Electrical, Mechanical, and Electro-Mechanical Properties" *Journal of Applied Polymer Science* vol 101, Issue 3, 2006, pp.1252–1256.
6. B. Kim, V. Koncar, E. Devaux, C. Dufour, P. Viallier, "Electrical and morphological properties of PP and PET conductive polymer fibers"*Synthetic Metals* vol146, 2004, pp.167–174.
7. D. De Rossi, F. Carpi, F. Lorussi, A. Mazzoldi, R. Paradiso, E. P. Scilingo, A. Tognetti, "Electroactive fabrics and wearable biomonitoring devices",*AUTEX Research Journal*, vol 3, n°4, 2003, pp 180-185.
8. M. Engin, A. Demirel , E. Z. Engin , M. Fedakar, "Recent developments and trends in biomedical sensors"*Measurement* vol37, 2005, pp.173–188.
9. A.P. Mouritz, M.K. Bannister, P.J. Falzon, K. H. Leong, "Review of applications for advanced three-dimensional fibre textile composites"*Composites* vol 30, Issue 12, 1999, pp.1445–1461.
10. Taïar R. Textile Technology: Application in Sport and Medicine (2014), International Journal of Chemical, Nuclear, Metallurgical and Materials Engineering 08(09):760-763.
11. R. Taiar, F.C. Boyer, N. Roche, D. Pradon, *(2013).*Technical and smart fabrics fibers orthosis for recurvatum knee in hemiplegic patients. Annals of Physical and Rehabilitation Medicine, Volume 56, Supplement 1, Pages e25-e26
12. Y. Traore, P. Lestriez, R. Taïar, K. Debray, D.Pradon, F. Boyer *(2013).* Design and optimization of a new kind of manual wheelchair. Annals of Physical and Rehabilitation Medicine, Volume 56, Supplement 1, Page e26.
13. Taïar, R, Y. Toshev, F. Boyer, A. Cherouat, G. Agnesina, S. Milusheva *(2007).* CAD and mechanical development of a new kind of hemiplegics orthesis. Journal of series on Biomechanics, Vol.23, N°.1 page 35-42.
14. H. Zaidi, R. Taïar, S. Fohanno, G. Polidori *(2010).* Turbulence model choice for the calculation of drag forces when using the CFD method, Journal of Biomechanics, Volume 43, Issue 3, 10 February 2010, Pages 405-411.

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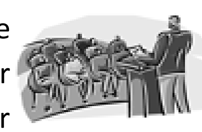

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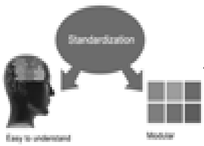

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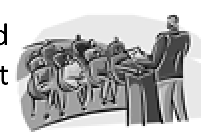

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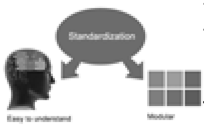

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Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
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Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
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