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NEW ADDRESS FOR IFSTTAR’S HEADQUARTERS
From November 12th to December 7th, IFSTTAR’s Parisian site (58 Blvd. Lefebvre) is moving to Marne-la-Vallée in the Bienvenüe building.
Please note our new contact information:
14-20 bd Newton - Cité Descartes, Champs-sur-Marne - 7747 Marne-la-Vallée Cedex 2 - Tel : +33 (0)1 81 66 80 00

INAUGURATION OF LABEX MMCD
Designated as a Laboratory of Excellence, the Labex MMCD (Multi-Scale Modelling & Experimentation of Materials for Sustainable Construction) will be inaugurated on November 30th, in Champs-sur-Marne, at the Cité Descartes.
This Labex, as part of the scope for the program Investments for the Future, will enable the support of international scientific projects for the benefit of advanced research on energy materials, and civil and environmental engineering. The MMCD project is one of the projects selected by international juries of the program Investments for the Future as part of the 2nd wave of Laboratories for Excellence. It is the recipient of a €6M grant to undertake innovative research on complex phenomena and materials for multi-scale structures in civil and environmental engineering. They draw from high tech competences in digital modeling, mechanics, physics, and chemistry, as well as original experiments, especially in the field of imaging.
Since November, the IFSTTAR agents at the Paris and Marne-la-Vallée sites started their move to the Bienvenüe building at the Cité Descartes, headquarter of the Pole of Research and Higher Education University Paris-Est (PRES UPE), in Champs-sur-Marne. A closer look at this move and its advantages.

Over 26,000m², the Bienvenüe building is a brand new, low-energy structure, certified High Environmental Quality – HEQ®. Starting in November, the headquarters of IFSTTAR, as well as its teams based in Paris and Marne-la-Vallée, has started to settle in. As part of the Paris Est Scientific and Technical Center¹ focused on sustainable cities, the new offices will also house teams from the École des Ponts Paris Tech, CSTB², SÉTRA³ and the School of Urban Planning, supported by the Paris-Est Marne-la-Vallée and Creteil universities.

“We share many research issues with these organizations,” says Vincent Motyka, Deputy Managing Director of IFSTTAR. “With this move, we will build on our shared knowledge through all parties involved on the new campus⁴ and we will constitute an actual reference centre in the sectors of construction and sustainable cities. At the same time, this strategic position on the campus will improve IFSTTAR’s visibility, and its attractiveness vis-à-vis foreign students and researchers.”

This move will also provide advantages in terms of work comfort, notably more modern, more ergonomic and larger laboratories. “A genuine advantage, especially for the Parisian teams who work in uncomfortable buildings, particularly from a thermal point of view,” Vincent Motyka specifies. 480 IFSTTAR agents are concerned overall! Much of the equipment will also travel. The most emblematic is undoubtedly the Platform for Structural Testing based in Paris. Intended for testing civil engineering components, this 30m-long x 8m-wide slab will be entirely rebuilt in Champs-sur-Marne… twice as big!

(1) www.univ-paris-est.fr/fichiers/paris_est_francais.pdf
(2) Scientific and Technical Centre for Building
(3) Technical Department for Transport, Roads and Bridges Engineering and Road Safety
(4) Those in the Bienvenüe building, but also others based nearby, such as the National School of Geographic Sciences (ENSG) and the School of Technological Innovation (ESIEE)

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QUESTION FOR BERNARD SAINT-GIRONS,
President of the PRES University Paris-Est

WHAT WILL THE ARRIVAL OF IFSTTAR BRING TO THE CITÉ DESCARTESES?

The arrival of these 480 IFSTTAR agents will bring all its strength in research and expert assessment to the Cité Descartes, a cluster focused on sustainable cities within the framework of Greater Paris. Our collaboration with IFSTTAR is already strong - it is a founding member of the PRES University Paris-Est - this move into the Bienvenüe building reinforces and solidifies it. It also provides a strong scientific content to this space shared with the École des Ponts Paris Tech and the School of Urban Planning. All of those involved will work together within the ‘City, Environment and their Engineering’ pole, on Engineering and on Humanities and Social Sciences at the same time.

IFSTTAR’s arrival will also embody and increase the legibility of the Institute “Efficacity”, dedicated to the energy performance of the city, in which public and private researchers will collaborate. IFSTTAR’s national establishment will also make creating new partnerships in view of networking possible, especially in the Environmental Health sector.
Airplane noise pollution under strict monitoring

DEBATS (Discussion on the Effects of Aircraft Noise Affecting Health), the first study of this breadth in France, evaluates the discomfort and physiological effects of airplane noise on people living near airports.

Though air transport is growing, the evaluation of plane noise on health effects is still in its infancy in France. The objective of DEBATS is “to better understand and quantify the impact of aircraft noise on public health”, explains Anne-Sophie Evrard, Epidemiologist with the UMRESTTE and in charge of this research program. The latter, financed by ACNUSA¹ and the Directorate-General for Health, is being carried out on the residents of Paris Charles-de-Gaulle, Toulouse-Blagnac and Lyon Saint-Exupéry. A longitudinal study involving 1,200 subjects has started this Autumn. It will make gathering information on the inhabitants’ health status possible via a questionnaire and measurements of blood pressure and heart rate. The sleep quality of a sub-sample of 100 residents living near Paris Charles-de-Gaulle Airport will be evaluated by having them wear an actimètre², and their exposure to noise will be refined by installing sonometers in their homes. At the same time, an “ecological” study will be developed. Geographical variations in noise exposure will be compared to those of consumption of medication, medical visits and self-medication of neighbouring populations. Field work will begin in January 2013 and the first results are expected in mid-2014.

¹ Airport Pollution Control Authority
² An actimeter allows one to record body movements during the night

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Smartphones equipped with eco-driving

The goal of the handheld application developed by IFSTTAR is to reduce energy consumption and resulting CO2 emissions using Smartphones and tablets.

“If you reduce your speed by 20 km/h, you will save 1 liter of petrol in the 100km to come”; “Think ahead to brake as little as possible”... These are examples of some advice that your Smartphone could soon give you via an app. The objective: improve driving by saving fuel, without sacrificing road safety. This software developed by LIVIC will use the Smartphone’s GPS and accelerometer to obtain location data, to deduce the speed of the vehicle and to show acceleration. “Reserved for Android Smartphones, it will not require any connection with the vehicle and will be free to all European drivers,” indicates Guillaume Saint-Pierre, Research Fellow, “contrary to onboard systems (powerful but not free) which use sensors placed inside the vehicle.”

This app should be available in 2015, following a series of tests over six months under actual conditions, which are planned for 2014. Olivier Orfila, Scientific Director of this project for IFSTTAR, specifies that “the results of these tests will be compared to those obtained with onboard systems in light-duty, thermal and electrical, but also in heavy good vehicles and hybrid buses. This app integrates the broad European project ecoDriver, which aims at reducing CO2 emissions in road transport by 20%.” An ambitious goal.

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Customised body

LBMC develops research for customising digital models of the human body, in order to represent various transport users.

“A few years from now, digital models of the human body should replace crash test dummies,” points out David Mitton, in charge of the biomechanical impact team of the Biomechanics and Impact Mechanics Laboratory (joint unit IFSTTAR-University Lyon 1). Beside the fact that computer simulation is much less expensive than setting up accidents under controlled conditions in laboratories, digital models make it possible to collect a much more comprehensive panel of information. But to do that, it is imperative that the virtual human models be representative of the actual population. However, those used currently, although very realistic, are mainly based on the morphology of a middle-aged adult male. So, it’s currently impossible to predict the lesions on the bodies of the elderly or children. LBMC’s objective is thus to model a vast range of morphologies (3-, 6-, and 10-year-old children, small women, large men, etc.) and to develop customised models.

To achieve this, the laboratory is setting up research on volunteers. Ultrasonic analyses of their bone structures and internal organs should make it possible to create varied biofidelic digital models.

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Distribution and transport: a Franco-German comparison

How do we address public policies on the subject of transport?
To that end, researchers at IFSTTAR and DLR in Germany studied the factors having an impact on logistics demand and transportation of goods for businesses in France and Germany.

The goal of the Franco-German research program carried out by Corinne Blanquart, Director of Research at SPLIT (Production Systems, Logistics, Transport Organisation and Work-Freight unit), in collaboration with the Research Institute of Transport (DLR) in Berlin, is “to analyze the strategies of goods transportation, and how they are decided”.

Over 120 shopkeepers, wholesalers, producers, and transportation companies were questioned in both countries, in order to better understand the clothing, pharmaceutical, and food sectors. This led to an interesting comparison, due to the differences in types and localization of businesses: increasing urban sprawl in France, discount stores gaining influence in Germany. “For transportation to evolve, everything is not just a question of the capacity of the transportation company or the availability of infrastructure,” pinpoints Corinne Blanquart. The frequency, volume, and transport distances, for example, also adjust within a macro-economic context (modes of consumption, economic policy or land-use planning); or meso-economic, such as power struggles between actors in the sector; and finally, micro-economic, with product strategies, restocking, etc.

The next phase in the study: a quantitative survey will make it possible to define the flows of goods transportation for businesses and the impact of the various factors.

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RILEM is the International Union of Laboratories and Experts in Construction Materials, Systems and Structures. Founded in 1947, RILEM gathers together over 1,200 experts from 70 countries. Its mission: to further scientific knowledge related to the materials and structures for construction, and to promote the transfer and application of this knowledge throughout the world.

About 30 researchers are involved in this international network in the “Materials” and “Infrastructures and Mobility” departments at IFSTTAR. For example, many of them actively participate in some of the technical committees dealing with traditional (cementing materials, bitumen products), or more recent (bio-sourced materials, life-cycle analysis) issues. But the Institute also has members in decision-making authorities: on RILEM’s board, on its technical advisory committee, and on the editorial staff of its newsletter “Materials and Structures”.

New evidence of this strong partnership: from September 2nd to September 4th, 2013, IFSTTAR and RILEM will co-organize an international conference at the headquarters of the Institute, in Champs-sur-Marne. More than 300 participants are expected.

The SCC 2013 will group together the 7th International RILEM Congress on Self-Compacting Concretes, the 1st International Congress on the Rheology of Construction Materials and the 67th RILEM Week, its most important annual gathering. Up till now, researchers working on building materials other than concrete (adhesives, plasters, mortars, etc.) did not have a regular meeting point for discussion. Yet, they use the same knowledge, the same techniques and face the same difficulties as their colleagues specialized in concrete. For the first time, the SCC 2013 will gather together these groups within a one-and-only event! The issues addressed will thus cover a broad area: formulation, measurement methods, modelling, production, quality control, sustainability, the environment, etc.

Nicolas Roussel, a researcher at IFSTTAR, was selected as President of the Steering Committee.

QUESTION FOR NICOLAS ROUSSEL, researcher in the “Materials” Department at IFSTTAR, Chair of the SCC 2013 Steering Committee

WHAT’S ON THE TABLE FOR THE SCC IN 2013?

The SCC 2013 will group together the 7th International RILEM Congress on Self-Compacting Concretes, the 1st International Congress on the Rheology of Construction Materials and the 67th RILEM Week, its most important annual gathering. Up till now, researchers working on building materials other than concrete (adhesives, plasters, mortars, etc.) did not have a regular meeting point for discussion. Yet, they use the same knowledge, the same techniques and face the same difficulties as their colleagues specialized in concrete. For the first time, the SCC 2013 will gather together these groups within a one-and-only event! The issues addressed will thus cover a broad area: formulation, measurement methods, modelling, production, quality control, sustainability, the environment, etc.

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ELECTRIC VEHICLES: THE ISSUE OF CLEAN VEHICLES

The electric vehicle is often presented as one of the solutions to reduce CO2 gas emissions and local pollution. But where do we really stand and is it ready yet to compete with internal combustion cars? Several IFSTTAR teams are looking into the problem.

Quiet and less dependent on fossil fuel energy, year after year the electric vehicle has become an important issue in today’s world. An unmistakable sign is the International Car Show held this year in Paris: an entire hall was dedicated to “electric and low greenhouse gas emissions vehicles”. In 2009, the former government had set a goal: to have 100,000 electric vehicles on the road by 2015 and one million by 2020, meaning a little over 3% of the car fleet. This objective is still in the pipeline, and facing this immense challenge, a dozen IFSTTAR teams have gathered within the Exchange and Research Group called Electric Vehicle (GERI VE) to transversally assess all technological, environmental and socio-economical aspects of this new vehicle. Several of these teams are also part of the project VeDeCom: Institute for Communicative Carbon-free Vehicles and their Mobility. This project will become the reference regarding the sustainable individual mobility sector, based at the site of Versailles-Satory.
At the moment, electric cars’ batteries have a maximum autonomy of 200 km. That is almost four times less than a recent internal combustion engine car. Why? Today, we do not know how to stock electricity as easily as petrol. To supply the same quantity of energy as a 60L tank, one would need a huge battery weighing several hundred kilos, an obvious hindrance for productivity. Apart from their size, recharging batteries takes a long time. “It remains impossible to get a battery that has enough energy to travel 500 km, while requiring it to charge itself in less than an hour,” explains Serge Pélissier, in charge of the Characterization and Modelling Batteries Group at the Transport and Environment Laboratory (LTE) for IFSTTAR. “Filling a 60-litre gas tank takes five minutes. Recharging a car’s 22-kilowatt-hour battery can take up to six to eight hours, mainly because of the electric system’s limitations”. Recharging an electric vehicle takes a long time, and on a nationwide scale, it really is a technical brain-teaser. In fact, each household receives only 3 to 6kW from the EDF network. “It’s impossible for everyone to fuel up with electricity at the same time without risking overloading the network,” continues Serge Pélissier. Surely, the recharging time can be reduced to a few ten minutes using special terminals, but this type of “flash” recharging requires 40kW of power, as much as for a whole building. Imagine 50,000 electric cars charging simultaneously throughout the whole country and you would have a general power blackout! Moreover, this way of recharging reduces the life of the batteries: a serious disadvantage, as a new battery can represent half of the electric vehicle’s price! Extending their battery life and slowing down their wear and tear is therefore a priority.

“SIX TO EIGHT HOURS ARE REQUIRED TO RECHARGE A BATTERY”

One of LTE’s assignments is to study the conditions and factors of this wear and tear: technology used (lithium-ion and its variances), type of recharge and recharging duration, temperature during storage and use, etc. “Ideally, batteries should last ten years,” explains Serge Pélissier. “Their wear and tear depends on the number of recharges, conditions of use and parking of the vehicle, so it is very complicated to verify and predict this data.” To achieve this, the LTE researcher artificially accelerates the batteries’ wear and tear under lab conditions, but this process usually requires nine months of testing. And yet, “it is a real race against the clock,” explains Serge Pélissier, “as each year, new manufacturing processes appear making Li-ion batteries ever more efficient.” How long will the battery remain the electric car’s weakest point? All bets are on.

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All car manufacturers agree: on the road, an electric car produces no carbon dioxide. But it recharges its batteries with electricity, and yet, two-thirds of it is produced worldwide using fossil fuels. To produce one kilowatt hour, a carbon power plant emits roughly 1000g of CO2. As a result, a Li-ion powered battery emits almost 250g of CO2 per kilometer, when a internal combustion car emits only 160g per kilometer.

France is not experiencing the paradox in this situation. France's power station facilities are mainly fed from nuclear energy and marine energies. Hence, French electricity emits only 85g of CO2 per kWh on average, even 45g of CO2 per kWh when electricity production is off-peak. Thus, we need to encourage recharging at night. Regarding the impact of the electric vehicle on the environment, it is very difficult to say. It would require taking into account all of the environmental impacts resulting from vehicles and the energy producing sector (pollution of air, water and soil, radiation, land use, etc.). At the LTE, Michel André is working towards the development of tools to simulate pollutant emissions to the scale of a city. If the vehicle does not emit hydrocarbon particles, it is nevertheless like any other motorised vehicle, the cause of emissions "not counting integral exhaust": particles from mechanical wear and tear of brakes or tyres, road surface wear; accumulated debris and dust on the road are resuspended airborne. “The tools for calculating emissions are still too inaccurate to allow the evaluation of the electric vehicle’s impact,” observes Michel André. “Never mind the fact that, at the moment, we can only formulate hypotheses on usage, mobility and the driving behaviour of future drivers.”

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"THE ELECTRIC VEHICLE EMITS 45 TO 250 G OF CO2/KM DEPENDING ON THE ELECTRICITY'S ORIGIN"
NEW DEMANDS AND NEW DRIVING

Among the French, who would be ready to make the leap from a combustion engine car to an electric car? “Taking into account the needs of independence and the possibilities of recharging equipment, about 5% of households of residents of Île-de-France might be interested,” reckons Fabien Leurent, from the City, Mobility and Transport Laboratory (LVMT), a joint research unit with IFSTTAR, the Ecole des Ponts Paris Tech and the University Paris-Est Marne-la-Vallée. To come up with this figure, LVMT has assessed the attractiveness and the role of the electric vehicle by thoroughly studying a sample of households representative of the French population. Their conclusions: the electric car could become the second vehicle for urban families, encouraging trips of under 50 km. The prickly issue of the battery remains (see page 8). “To recoup a vehicle’s cost, some car manufacturers suggest renting the battery,” says Fabien Leurent. “It would them enable to overcome the obstacle of the additional cost when buying and, according to our model, to increase potentially interested Île-de-France households from 5 to 15%. In addition, the new government has committed to paying a 7,000€ buying bonus.” A fleet of electric cars should also find use for local authorities and companies. According to Fabien Leurent, car sharing has yet to become part of the company’s culture: “most have a traditional approach to handling their employees’ mobility.” We’ll see if this will be enough to widen the access to electric vehicles, but in the meantime, the Ergonomics and Cognitive Sciences applied to Transport Laboratory (LESCOT), is already questioning itself about the new behaviours future users might adopt. A year and a half ago, car manufacturer BMW asked LESCOT for help in studying the mobility of 50 Paris-based drivers using their MINI E daily, a two-seat, electric prototype vehicle, with an autonomy of 160 km. The experiment lasted six months and showed that some drivers were using the MINI E more for shorter trips than they would do with their own vehicle. More broadly, they proved to be more careful while driving in an urban area, and have adopted an “eco-driving” style consuming less energy. “They appreciated the regenerative braking system, which enables the battery to recover energy when braking,” explains Elodie Labeye from LESCOT. Following this experience, the researcher has developed another study, this time focusing on interactions with pedestrians. It showed that in an “urban area, pedestrians become aware of the electric car’s presence very late, especially since the electric car is silent at lower speeds.” Fortunately, the experience revealed that the absence of noise has a positive impact on the drivers’ vigilance. Because pedestrians do not hear the vehicle coming, drivers tend to slow down when approaching them. Despite this increased need for vigilance, the majority of drivers do not wish to have the electric vehicle made noisier artificially, as it was planned at some point. The silence of the vehicle is actually considered as one of its strong points.

List of IFSTTAR laboratories gathered within the GERI VE
• Socio-economical aspect: DEST, LVMT and SPLOTT
• Aspects related to the driver (acceptability or feedback, for example): LESCOT, LTE, LPC
• Technological aspect (energy optimization, power component): LTE and LTN
• Aspects related to new usages and functionalities (in partnership with STIC, for example): LEOST and LIVIC
A railway control and traffic simulator

IFSTTAR soon will add a new module to its ERTMS simulation platform in Villeneuve d’Ascq.

“The platform was made up of only two modules until recently,” points out Étienne Lemaire, Engineer and person in charge of the equipment. “The first simulates an ERTMS train in a 3-D environment and allows testing of various driving scenarios. And the second is a traffic simulator, capable of reconstituting the behaviour of an entire fleet of trains, in the aim of assessing procedures in a traffic situation.”

A few years ago, more than twenty train control and signalling systems coexisted on the old continent, often incompatible with each other. The ERTMS, currently being deployed, will result in a standardisation and an improved interoperability of the rail transport network.

(1) European Railways Traffic Management System
(2) www.cisit.org
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4 ! That’s the number of fully-functional ERTMS platforms that will be available in Europe when the one in Villeneuve d’Ascq will be completed. In 2013, the platform will mobilize eight people, and will act as support for two theses and two ANR projects.

The role of the ERTMS, the future European main control system, will be to manage the distance between and the speed of the trains via beacons or GSM-R radio links. IFSTTAR’s Laboratory ESTAS dedicates a simulation platform to this on its site in Villeneuve d’Ascq. Installed in 2006, this equipment was already used for several theses; at a cost of 750,000€, it was paid for with the help of the Nord-Pas-de-Calais Region and the FEDER within the framework of the regional project CISIT. It will be used in 2013 as part of two ANR projects. But this formidable tool will continue to evolve in order to generate the interest not only of researchers, but also of industrialists. In fact, launched in 2011, the acquisition of a new module should be completed next year with the cooperation of a Spanish laboratory. This new structure will be used as test bench for certification of the EVC (European Vital Computer), onboard computers taken on the trains. With that, the Villeneuve d’Ascq platform will thus become a testing laboratory and assist the deployment of the ERTMS system as effectively as possible. “We have been working with ESTAS for six years. We have provided them with various tools for ERTMS simulation (operational and traffic simulator), as well as testing systems for ERTMS onboard and track-side equipment. We have stayed in touch with them, since the tools that we had provided were required to evolve as a result of research undertaken at IFSTTAR. ESTAS then asked us, along with a team from the University of Technology in Compiègne, to become a part of the ANR VEGAS and PERFECT projects, which will start in the next few weeks. It’s an opportunity to increase the performance and the features of our systems even more. Collaborating with organisations such as ESTAS, which are in charge of setting up standards or research structures, gives us the chance to be kept informed about the changes to come, which, for a company like ours, is obviously invaluable.”

PATRICK DEUTSCH, Technical Director of the industrial software company ERSA, based in Haguenau (Bas-Rhine).
Transport, infrastructure, sustainable cities, natural risks... IFSTTAR’s ongoing research aims at improving citizens’ living conditions, and more broadly, at bringing about the sustainable development of our society. Hence, the importance for the Institute to have exchanges with the general public about the works initiated by its teams. And in this area, IFSTTAR exhibits true dynamism.

Thus, barely nine months after its creation, the Institute\(^1\) had already signed a “Charter of openness in expert assessment to society”, engaging it to better share its findings with the general public. “Through this charter, the signers made three major commitments,” specifies Jean-Michel Fourniau, Sociologist for the Department of Transport Economics and Sociology (DEST): “to increase the openness and the transparency of their work, to improve the sharing of the available scientific findings, and, lastly, to better take into account the contribution of society’s actors in the processes of risk assessment.”

The establishment of this charter translates into very concrete actions. Among them: “the National Scientific Meetings in Bron”, co-organized by IFSTTAR in the city of Bron. “They are meetings and discussions between citizens and researchers on the topic of the sustainable, social and civilian city”, explains Jean-Michel Fourniau. This is a large-scale operation that started in October and will last three years.

At the same time, IFSTTAR actively contributes to the Scientific Interest Group (GIS) “Public participation, decision, participatory democracy”\(^2\), in the field of Humanities and Social Sciences. Created in 2009, it assembles over 50 laboratories from various research organizations\(^3\); its steering also brings together State institutions and agencies, local and regional authorities, companies and associations representing civil society. “This GIS demonstrates its full value in the visibility given to francophone work, its interdisciplinary exchange, and the organization of a productive debate dealing with transversal questions, subscribed to as much by researchers as by the actors in the dialogue with citizens”, points out Jean-Michel Fourniau, leading this GIS.

Last but not least, IFSTTAR is pursuing its strategy of exchange with the public on the Web, launched in 2011. Though already active on Facebook and via Twitter, the Institute intends to gradually invest in data-sharing platforms on the Internet, such as slideshare, the well-known DailyMotion, or even the recent Google+ social network. This is a complementary strategy that allows helping a varied audience discover its research and expertise activities.

\(^{(1)}\) Other signers: ANSES, INERIS, IRSN, IRSTEA

\(^{(2)}\) www.participation-et-democratie.fr

\(^{(3)}\) The CNRS (which chairs this GIS), IFSTTAR, IRSTÉA, CIRAD, INRA and many university laboratories

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Interview with Karine Bruyère-Garnier

Research fellow at the Biomechanics and Impact Mechanics Laboratory (LBMC), Karine Bruyère-Garnier received its accreditation to supervise research (HDR – Habilitation à Diriger des Recherches) this summer, specifically on the acquisition of geometrical and mechanical data of anatomical parts. One of her objectives is to analyze the resistance of the liver in order to improve the safety of transport users.

How did you come to work on this subject?

I had been trained in Mechanics at INSA in Lyon and over the course of that I had become interested in Human Biomechanics. It all started with a training course, in 1995, at the Laboratory of Biomechanics and Safety of Users at INRETS. There, I worked on facial resistance in the event of impact. After completing a DEA (postgraduate diploma) on composite materials, quite far from my actual subject, I continued with a thesis on the mechanical behaviour of bone as related to osteoporosis, at the Solids Mechanics Laboratory at INSA in Lyon. I was then recruited by INRETS in 2000, where I carried out and oversaw research on the face, the shoulder, and the thorax, and on soft biological tissues. Since being awarded the HDR on July 13th, I officially supervise theses.

What is your actual job today?

To contribute to the development of the most reliable digital models of the human body as possible, in order to predict the risks of wounds in the event of impact. For example, we have to know if with one specific deformation of an organ there will be a lesion or not. Today, with crash test dummies, it is not possible to analyze and predict the consequences on various internal organs (the aorta, lungs, liver, spleen, etc.). Some of these organs are characteristically vascularized and exhibit a complex geometry and mechanical behavior (hyper elasticity, viscoelasticity, anisotropy). And even from a practical point of view, their consistency makes accomplishing standard mechanical tests more difficult (e.g. problems in removing and keeping samples). I am currently working on the behaviour of the liver, a very complex organ to understand. For example, we have to identify and quantify which type of mechanical stress will lead to the rupture of the surface of the liver, taking into account the presence of the vascular system and the fluid contained within. Additionally, I am interested in the microstructure of the tissue that composes this organ. To do that, I specifically use histological sections of the liver capsule to observe the collagen fibre network inside it and see how it reacts under pressure.

What are the characteristics of this research and how does it help this sector?

One characteristic is that we perform our research on the organs and tissues, rather than the entire body. So, working at a local level makes it possible to more correctly predict a lesion of the organ starting based on digital models. However, analysis of internal organs like the liver is still very recent, and there is still a long way to go before perfecting their modelling.

Does your research only deal with impacts related to transport?

It is the main focus, but the digital models of the human body to which we are contributing can also be used in other fields. For example, surgery, sporting or household accidents come to mind, or even the outcomes of fights…

(1) National Institute of Applied Sciences

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The Territories and Mobility working group at the IHEDATE\(^1\), led from November 2011 to May 2012 by an IFSTTAR researcher, offers analysis of transportation development based on territories and their respective needs.

Mapped out in 2011, the National Transport Infrastructure Plan (SNIT) planned for a certain number of investments in transport, in France. But then the crisis happened. “And only 55 to 60% of SNIT could be financed,” sums up Jean Debrie, Research Fellow at SPLOTT\(^2\). “So, some choices have to be made.” And to shed some light on them, this specialist in urban planing led the Territories and Mobility working group for nine months, bringing together about ten experts. Its mission: to compare economic and geographical data in order to better fathom transport infrastructure in light of territories’ needs.

Results: a fresh perspective
“\(\text{We had total freedom of reflexion,}^{\text{3}}\) “ensures Jean Debrie. “The contractors did not lobby. They understood that their core business was going to change radically, and prepared for that coming.” In fact, the expert assessment was co-financed by the ASFA\(^3\), the ATR\(^4\) and the FNTP\(^5\). But it was IHEDATE, an organization accustomed to multidisciplinary reflexion, that oversaw the expert assessment. Experts defined five recommendations\(^6\), which were then applied to five testing areas in France. These recommendations were submitted to the Economic, Social and Environmental Council (CESE), the Interministerial Delegation for Territorial Planning and Regional Attractiveness (DATAR), as well as to various institutional players. The ball is now in their court.

\(^{1}\) Institute of Advanced Studies on Land Use Planning and Development in Europe
\(^{2}\) Production Systems, Logistics, Transport Organization and Work - Freight unit
\(^{3}\) The Association of French Motorway Companies
\(^{4}\) The French Roads Technical Association, grouping together private companies
\(^{5}\) National Federation of Public Works
\(^{6}\) Summary may be consulted online: http://www.ihedate.org/?L-IHEDATE-et-le-SNIT

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**HOW DID THE IDEA FOR THIS EXPERT ASSESSMENT COME ABOUT?**

The establishment of a National Transport Infrastructure Plan is very important for professionals, because it allows us to anticipate our activities. But it must be operational and arranged hierarchically. Rather than creating a top-down hierarchy, it initially seemed important to me to analyze the mobility needs of the territories. From there, and based on existing transport infrastructure, it becomes easier to build an optimization or a development plan for transport infrastructure. As a former IHEDATE auditor, I immediately thought that, supported by geographers, this institute should be able to provide the framework for this reflexion.

**WHAT FUTURE DO YOU SEE FOR THIS COLLECTIVE REFLEXION?**

The objective is to use this method, which has displayed its complete relevance on a broader scale, and of course, to create the new SNIT. We will know more after its assessment in the first quarter of 2013.

PIERRE CALVIN, Director of Prospects and Institutional Relations at the Colas Group, President of ATR\(^4\)
Weather and roads: a promising partnership

Nour-Eddin El Faouzi is the Director of the Transport and Traffic Engineering Laboratory (LICIT). He has just led the drafting of a veritable guide on the management and the regulation of the road networks in difficult weather conditions.

ConcreteLy, what purpose does your book serve?

We can all remember climatic events that have disturbed one of our trips: pouring rain, snow, black ice, and accidents caused by fog. However, today, it is rare for traffic operators (TomTom, Mediamobile, etc.) and infrastructure managers (APRR, AREA, ASF, DIR, etc.) to integrate weather data and their impacts (road conditions, traffic delays, etc.) into the information that they diffuse. In light of this, we have undertaken the work of quantification and modeling in order to propose tools that will allow the construction of strategies for managing weather-effected traffic, to make circulation more secure and more fluid.

How was it created?

This book is a collective work, being the product of the reflexions and work of no less than 28 authors, including myself, within the framework of a COST¹ action gathering together over 18 Europeans countries. I also included our Australian (University of Monash and Queensland University of Technology in Brisbane) and Japanese (University of Tokyo) colleagues. We have taken the state of the art carried out on this subject in 2010 as a starting point. In addition, we have worked in close collaboration with the Federal Highway Administration (FHWA), which heads up a similar program in the United States.

To whom is this work addressed?

To traffic operators, infrastructure managers, as well as researchers. Indeed, inside it, you can find a complete analysis of the impacts of meteorology on transport infrastructures and user behavior.

(1) European Cooperation in Science and Technology

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Editors

Nour-Eddin El Faouzi, Bernhard Heilmann

Authors: Nour-Eddin El Faouzi, Bernhard Heilmann
Collection: Recherches
Ref. R286 / 85 €

PROCEEDINGS OF THE DRIVING SIMULATION CONFERENCE EUROPE 2012
September 6 and 7

Authors: S. Espié, A. Kemeny, F. Mérienne
Collection: Actes
Published in September 2012
Ref. A134 / 85 €

S3 NATIONAL PROJECT: MONITORING THE SAFETY & STRUCTURAL INTEGRITY OF STRUCTURES

Authors: A. Orcesi, C. Cremona
Collection: Études et recherches des laboratoires des ponts et chaussées
Published in November 2012
Released in French
293 pages / Ref. OA 71 / 35 €
Jacqueline Lecourtier has become the new President of the Scientific Board at IFSTTAR for a four-year term, following the nomination of her predecessor Jean-Yves Mérindol, as Higher Education and Research Advisor at Élysée.

“IFSTTAR’S RESEARCH IS AT THE HEART OF THE CURRENT ISSUES.”

You have a lot of experience of the world of research. What has been your career path?

I was initially a researcher at the CNRS on colloids and polymers, then at the French Institute of Petroleum (IFP) on themes related to the exploration and the production of hydrocarbons. In 1995, I became Director of Research in drilling and production, then in 2000, Scientific Director at the IFP. In 2006, I was put in charge as Executive Director of the National Research Agency (ANR), a position that I left last January to become an independent consultant in Energy and Environment.

What were your connexions to IFSTTAR?

They were many: first, within the framework of IFP in the field of Soil Mechanics and Rheology with the LCPC, but also Transportation with INRETS. Then, within the framework of the ANR, I have been able to ascertain the dynamism of the two research institutes via their numerous project proposals. IFSTTAR, resulting from this fusion, provides a very coherent framework for research in Transport, Infrastructure and, more generally, Land-Use Planning. This makes it possible to address research topics such as sustainable cities or transportation of the future in multidisciplinary ways.

What do you consider your role?

I will endeavour to lead in a consultative manner this Scientific Board, which is particularly well-balanced, in my opinion, in terms of competences: it gathers together scientific specialists from the fields of Transport, Health, Engineering, and Environment, but also the industrialists (Renault, Colas, the SNCF, PSA, Syntec Ingénierie, etc.). It should provide the IFSTTAR teams support for innovation, but also assist them in offering relevant expert assessment to state authorities and companies. Its wide range of international contacts is also an asset, from which one should take advantage, with representatives in Portugal (Universidade do Minho), Switzerland (EPFL), and Germany (DLR).

Which main issues will you advocate?

IFSTTAR’s research deals with fundamental problems for our future and our society. The sustainable city is one, including major topics related to energy and transport, but also communication, safety and increasing life expectancy. The interdisciplinarity between the so-called “hard sciences” and Humanities and Social Sciences is at the heart of these problems, and it will have to be developed. IFSTTAR must adapt to the changes in the system of research, create connexions with new players, whether they be new university multi-disciplinary centres (Initiatives for Excellence or IDEX), or technological research institutes (IRT, IEED, etc.). Lastly, it will have to develop fruitful international partnerships.

(1) Study of deformations, in particular of soils
(2) École polytechnique fédérale de Lausanne
(3) Deutsches Zentrum für Luft-und Raumfahrt: The German Aerospace Centre