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DIARY


February 11th-12th, 2013 • Road Techniques Day, in Nantes. Further information: http://actions-incitatives.ifsttar.fr/seminaires/jtr/

April 14th-17th, 2013 • Transport Research Arena, in Paris. Further information: http://www.traconference.eu/

IN BRIEF

CALL FOR PAPERS, EWSHM IN NANTES FROM 8 TO 11 JULY 2014

IFSTTAR, INRIA and the University of Nantes are organising the 7th European Workshop on Structural Health Monitoring (EWSHM), at the Cité des Congrès in Nantes, from July 8th to July 11th, 2014. EWSHM 2014 will present a unique programme, including dedicated sessions, invited sessions, a surprising social agenda, industrial and Research & Development sites visits, notably that of IFSTTAR Nantes.

Proposals for oral presentations, posters and invited sessions can already be submitted via the workshop’s website according to the following themes:

- Physical monitoring principles (visual, mechanical, acoustic, electric, thermal, wave propagation, etc.)
- Signal processing (FFT, wavelet, PCA, feature extraction, pattern recognition, etc.)
- Structural simulation (modelling, constraints and deformation, modal and vibratory analysis, acoustic, electromagnetic, thermal, neural networks, etc.)
- Sensors and sensor networks (wireless, energy recovery, topology, fibre optics, electromagnetic, MEMS, nano-sensors, etc.)
- SHM principles and methods based on the design, maintenance and monitoring of structures
- SHM applications in aerospace, nautical, railway, automobile, pipeline, civil engineering, structures of energy production and distribution (windmills, nuclear, etc.) sectors.

Companies and laboratories are able to present their services and research products to all the actors in SHM via exhibition stands. Several sponsorship initiatives are also offered, constituting as many opportunities to better promote awareness of the concerned companies to an SHM audience.

Contact: contact ewshm2014.com
http://www.ewshm2014.com
Life is a carrousel!

After 35 years of use, IFSTTAR’s traffic simulator, continuously adapted to changes in road engineering, is still one of the largest pieces of wear equipment in the world: one uses it to study in the span of a few months the effects of decades of heavy lorry traffic on roadway.

Driving in a carrousel! It’s an idea that LCPC engineers had in 1973 for studying roadway deterioration caused by traffic, in an accelerated manner. The installation appeared in 1978 at the Nantes site, and was finally inaugurated in 1984: two, 40m-diameter rings, a 6m-wide roadway on which loads of more than 13 tons could travel up to 100 km/h. “In two months, one can simulate the passage of a million lorries, that is to say 20 years’ lifetime for a roadway with average traffic,” summarizes Pierre Hornych, Director of LAMES (LABoratory for Modelling, Experimentation and Survey of transport infrastructures).

The carousel made it possible to test nearly 130 roadway structures (mainly new), maintenance techniques (maintenance and reinforcement), wearing courses (to avoid the creation of ruts), parts of roadway systems, instrumentation or inspection systems, etc.

The current equipment comprises three rings, each one allowing several tests simultaneously. One of the rings is equipped with a concrete tank underneath the pavement, for reproducing seasonal water cycles (by controlling the water table level). Combined with laboratory testing, sometimes carried out within the framework of international research, these experiments provide input for the models, making it possible to nail down methods for dimensioning and pavement reinforcement, or to develop products and building techniques for road management specialists. They all are financed by industrial contracts.

In addition to roadway maintenance and degradation mechanisms, the studies are now concerned with the sustainability of solutions using recycled materials, repairing of new urban roadways, and all of the equipment that needs to be tested within the framework of the 5th Generation Road project (for collecting and storing energy, supplying power to electric vehicle, etc.).

A QUESTION FOR JEAN-LUC GAUTIER, Technical Director, in charge of COLAS’ Centre for Expertise and Documentation

WHAT ARE YOUR CURRENT EXPERIMENTS WITH THE CARROUSEL?

Last fall, we tested a new method for detecting the fatigue cracking in asphalt pavements. Starting in the base layer, these cracks then move slowly upward to the surface, where they then can be detected. Our new solution is based on unbroken fibre optics unrolled inside the asphalt pavement (in two, 10m sections in the carrousel). As a result of our initial tests, it detects the cracks as soon as they appear, along the entire zone of traffic, well before they materialize on the surface. A second trial run is planned this autumn, tested to roadway failure. Road testing should not be far behind. Similar to our previous carrousel testing, these will allow us to anticipate our products’ behaviour in real-life use: a major asset.
The DIOGEN databases: Impact data for civil engineering works

Established under the aegis of the AFGC (French Civil Engineering Association) and accessible on diogen.fr, this database provides the environmental impacts of standard NF P 01-010 (and soon of 15804) for materials used in realising civil engineering works as downloadable documents.

Its uniqueness is based on its adaptability to the French context of civil engineering. It was born out of the analysis of data, sometimes incomplete, often too general or too specific, unsuitable, or with a lack of traceability.

Useable during various phases of a project, DIOGEN is geared toward all those involved in civil engineering: engineers or technicians, architects, teachers or students, whether they be clients, designers, directors or researchers. Only the material manufacturing process is taken into account, from extracting the raw materials, until the product leaves the factory. Their use must also be integrated into an approach like Life Cycle Analysis (LCA) that takes into account their end of life. Co-led by SETRA and IFSTTAR, a group bringing together representatives from material suppliers, companies, engineering departments and institutions carried out the work.

DIOGEN is based on available data, evaluated by an expert committee with a specific methodology (the evaluation results will be available online following a phase of consolidation). As part of this work, thematic working groups, using industrial processes of production involved, developed data unavailable elsewhere. At the end of 2013, DIOGEN comprises the major materials used in civil engineering: concretes, steel for reinforced concrete, cements, aggregates, metal studs, metal sheets, wood, etc.; the base will be progressively supplied with new data and updated.

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The Global Human Body Model Consortium’s abdomen created by the LBMC*

Starting in 2008, the Global Human Body Model Consortium (GHBMC) has been researching and developing human body modelling for applications in crash safety technology.

Today, the GHBMC includes 8 members: Chrysler, General Motors, Honda, Huyndai, Nissan, PSA Peugeot Citroën, Renault, Takata; and two associate partners: the American NHTSA, and an association of German manufacturers, PDB. Work was carried out in 6 expertise centres selected by the consortium, and handled by 5 academic partners: Wake Forest University, Wayne State University, Waterloo University, the University of Virginia and IFSTTAR. The LBMC at IFSTTAR was actually selected to model the abdomen, in collaboration first with Virginia Tech, which performed the experimental work, then with the LIER.

Over three years of coordinated work led to the creation of first GHBMC model in 2012 (Phase 1). Work now continues in second phase of 5 years, with improvements on the model and developing models of various sizes and postures. The abdomen developed at the LBMC was validated in about twenty impact situations, leading to the development of preliminary tests data for damage to solid organs. This is the first abdominal model for which an internal reaction could be evaluated using the moving images of internal organs, obtained by the work carried out by Virginia Tech and the LBMC. The entire model, or sections of it, was subjected to over 60 impacts situations and criteria for damage to most parts of the body were proposed. After completing this work, the GHBMC announced the model’s availability via commercial or free academic licensing.

*LBMC : Biomechanics and Impact Mechanics Laboratory.

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Invisibility in motion

The Smartwalk project will allow geolocating Smartphone users without a trace.

“Smartphones have revolutionized everyday life, especially as regards geolocation-based applications such as Move or Facebook,” explains Valérie Renaudin, from the Geolocation team at IFSTTAR. “However, this progress is harmful to people’s right to privacy: especially if the application uses WiFi networks and not GPS; their exact location can be memorized and analyzed to reconstruct a user’s timetable or habits.” The European Parliament is actually considering the private character of the data, through the LIBE Committee. “In addition to this legal response,” she continues, “a purely technical approach is possible, making it possible for users to be geolocated without leaving a trace.” How? By using the various sensors installed in Smartphones that measure inertia, gravity or temperature. “By exploiting this information, one can figure out an individual’s mode of transport (walking, running, bicycle, or vehicle) and reconstruct their routes by using GPS when possible, and navigation in cases where the GPS signal is too weak, indoors for example.” This is the goal of the Smartwalk project, for which Valérie Renaudin was awarded a Marie-Curie grant (100,000 €).

Coming soon: an international version of the software Ecorce

This “eco-comparer” of roadway construction and maintenance is being translated and adapted to foreign contexts.

IFSTTAR has been developing the software ECORCE since the early 2000s. “We started working on a tool able to guide the contracting owners’ decisions and to ensure them being as ecological possible,” explains Agnès Jullien, Director of the Environment, Planning, Safety and Eco-design Laboratory (EASE) at IFSTTAR. “We developed a software able to compile data on the life cycle of materials, the position of the infrastructures, the transport times, and even the design of the earthworks.” Distributed freely on the Internet in 2013, this software initially devoted to roadways (ECORCE 1), then extended to earthworks (ECORCE 2), has had so much success that foreign organisms are now interested in it. “For example, we are developing an English version with researchers at Davis/Berkeley,” she specifies. Apart from the translation of the software, it requires today to adapt the tool to each country’s specific conditions, according to the climate, the availability of aggregates, the different transportation options, or the energy environment. The definitive international version of ECORCE should be available sometime in 2014. While waiting for that, ECORCE 2 is available for download on: ecorce2.ifsttar.fr.

(1) Civil Liberties, Justice and Home Affairs.

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Next April, a new institute devoted to ground transportation will arise.

During the TRA 2014 conference (Transport Research Arena), a new research institute devoted to road traffic management will be unveiled. Baptized Nearctis+, it has the dual defining feature of being European and virtual. “It is a continuation of the Nearctis network, which allowed a five-year collaboration of several European research organizations to work on road traffic,” explains Samuel Sellam, entrusted with coordinating IFSTTAR’S “mobility” theme. Road traffic has evolved significantly the last few years. And today, to grasp its phenomenology, it is necessary to rely on a broad array of disciplines, such as psychology, fluids dynamics or automation.

With researchers from the University of Delft (Netherlands), we studied the way in which vehicles fit into motorway traffic. This was done comparatively, by pooling national programmes. In effect, two motorway access ramps have been shot for one hour from a helicopter; one in the Netherlands, the other in France (as part of the MOCoPo Project). Nearctis offered an ideal framework for comparing the results. Initially developed in the Netherlands, the computer code allowing one to follow the movement of each vehicle in the images was improved upon in France. We could thus define, for the first time, the rules of how vehicles change lanes. The result: motorists fit into areas much smaller than predicted by the models. This will make it possible to improve simulations, and thus the regulation of motorway traffic.

“Also, to improve the quality of research,” says Christine Buisson, Research Director for the Transport and Traffic Engineering Laboratory (LICT) “we needed to pool together European skills” […] “as well as the databases, in order to create applications that could operate on an international scale,” adds Samuel Sellam. That is the reason why the European Commission has been financing the Nearctis network since 2008. “We identified the most relevant research projects for the future, and listed the traffic problems observed throughout Europe, in order to suggest concrete solutions,” he continues. “We also reviewed all of the courses dealing with transportation, in order to create a curriculum for a possible dedicated Master’s degree,” Buisson resumes. The idea here is to give advice to schools or universities that want to offer classes on transportation.

Five theses were funded, and three summer schools organized. “Overall, 120 students attended, who will work in research, as well as for local government agencies, or in the private sector,” rejoices Buisson. “This will facilitate the establishment of future collaborations.” Finally, Nearctis enabled a pooling together of operational resources of member institutes, and joint research. Provided with its own 10,000€ budget, Nearctis+ should continue the work started by the network: lobbying the EU, launching projects and summer schools.

* Network of Excellence for Advanced Road Cooperative Traffic management in the Information Society.
Making Our Cities More Sustainable

Air pollution, unbridled energy consumption, noise, small heat islands, urban sprawl... the time is now for rethinking our cities! Here’s a closer look at various research being carried out by researchers at IFSTTAR.

How does one scientifically evaluate the sustainable character of a city, a district, a real estate project, a construction, or even of an urban transport plan? What are the most pertinent indicators? Can one simulate and compare the impacts of such-and-such scenario? And how does one help local authorities to make the best decisions? “With the Planning, Mobilities and Environment department (AME), many scientists are involved in research projects intended to answer just these questions”, its director Gérard Hégron indicates. “With the other researchers at IFSTTAR, they are thus endeavouring to meet one of the four major challenges which our Institute has established for the ten years to come: to envisage and plan sustainable cities and territories.”
Better Evaluate the Sustainability of Urban Projects

Today, to evaluate the sustainability of construction or urban development projects, decision makers are often confronted with two problems: a lack of objective data, and the absence of dialogue between the numerous actors potentially concerned (local authorities, developers, promoters, council estate and housing associations, public transport authorities, future users, etc.).

“To remedy this situation, the City, Mobility and Transport Laboratory (LVMT) of the AME department is taking part in the research project Impetus, which will be completed at the end of 2013,” states Olivier Bonin, researcher with the LVMT in Marne-la-Vallée. The concept? To bring together all the stakeholders concerned with urban projects to the same table, and to provide them with the scientific data necessary for fuelling the discussion. The target objective is for decisions to be taken in the most objective and transparent manner possible.

At the heart of the operation: a decision support tool developed by the LVMT; a software able to calculate several dozen objective indicators of an urban project’s sustainability. In practice, these indicators cover the three significant environmental, economical and societal components. For example, for a housing project, the tool does not only estimate the buildings’ future energy consumption, but also the energy consumption linked to future users’ home-to-work commutes (by car, by public transport, etc). This computation engine can also estimate the greenhouse gas and polluting emissions, housing costs for future residents, the maximum land capacity, and even social balance. “The idea is also to be able to choose between various strategies and options”, Olivier Bonin says. For example, at the district level, one could favour the construction of a positive-energy building, a tramway or, quite simply, increase the frequency of buses.

For the time being, researchers at the LVMT are putting the finishing touches to their computation engine via four current projects of the promoter, Icade: the construction of several hundred residences in Bordeaux, Pessac, Villiers-le-Bel and Sarcelles. The stakeholders are also thinking of the best way of presenting a summation of the various types of results. “We already have very positive contacts with those in the industrial sector,” beams Olivier Bonin. “You actually get the impression that there is a strong demand for this kind of decision support tool, as regards sustainable urban development.”
Public transports also represent key leverage points for making cities more sustainable. “For several years now, all urban areas with over 100,000 inhabitants have had to establish Urban Transport Plans (PDU) to better control mobility,” indicates Michel André, Deputy Director of the AME department. “Recently, they are also required to draft a report on the environmental impacts of the proposed measures.” These measures can include the construction of a bypass road, priority bus lanes, tramways, new bridges, to access for self-service bicycles or electric cars, actions in favour of car-pooling, limiting speed or even the increase of parking prices. In view of helping cities with this complex task, the National Research Agency (ANR) financed an interdisciplinary project called Eval-PDU. Its objective: to develop a methodology for evaluating the environmental impacts of an Urban Transport Plan, and its socio-economical consequences.

“Within the framework of this project, researchers from the AME department developed digital models that are able to simulate the evolution of several environmental indicators related to air quality, noise and the impact on townspeople’s health,” explains Michel André. They applied them to a very concrete case: the PDU of the Nantes conglomeration. According to their results, greenhouse gas emissions had supposedly increased by 8% between 2002 and 2008 (because of an increase in traffic), while road traffic emissions seem to have decreased overall (for example, 21% of nitrogen oxides, thanks to technological improvements of vehicles), as well as the medical impact related to these pollutants (28%). However, the models point sensitive increases concentrations on the ring road and on the main roads crossing the city through its centre. These models also made it possible to create maps demonstrating the change in noise pollution on various districts. Still in the Nantes conglomeration, researchers compared many scenarios, in particular a pared-down PDU favourable to cars and a pro-active PDU as regards public transport. Many criteria were simulated, such as automobile traffic, greenhouse gas emissions, and energy consumption. The most striking result: the pro-active PDU would reduce the number of townspeople exposed to more than the legal limit of nitrogen dioxide (40 μg/m³ on average annually) by 34%.

In general, these are the tools and assessment practices that the researchers are trying to improve: starting with the availability of data (knowledge of traffic, change in behaviours, etc.) which influences the plausibility of the results, especially in a forward-looking vision, but also the capacity of the tools to report on measures to evaluate (green transport modes, park-and-ride facilities) and phenomena (dilution of impacts on regional pollution) to be evaluated.

Finally, they insist on the importance of having a good match between the assessments and the disciplines (travel, traffic, pollution, environment, socio-economical impacts) with the political stakeholders.
REDUCING NOISE POLLUTION

Urban expansion increases artificial surfaces to the detriment of natural surfaces. This often causes damage to environmental quality, such as the creation of urban heat islands, an increase in atmospheric pollution... as well as noise! So, sustainable urban development must also incorporate noise reduction: the Environmental Acoustics Laboratory (LAE) is working toward this goal at IFSTTAR’s Nantes site.

As part of the ANR VegDUD research project, scientists at the LAE measure and model the influence of green roofs and façades on urban noise levels, at the street level. We certainly know that vegetation has a direct effect on sound pollution, especially due to the absorbent properties of the substrates on which they are installed; these green infrastructures can also influence sound propagation by modifying wind fields and temperature. “Manufacturers of green façades were highly interested in our work, presented at the World Green Infrastructure Congress in Nantes in September,” exults Benoît Gauvreau, Research Fellow at the LAE. The LAE is also participating in another project called Eurequa4. The work involves studying and modelling various urban project scenarios on the environmental noise of neighbourhoods; in other words, the impact at the purely physical level (decibels, reverberation decay, etc.), as well as on perception and sensation of neighbourhood users. “This research requires actual trans-disciplinarity between “hard” sciences and human sciences (psychological, sociologists, town planners, etc.),” Gauvreau explains. To give you some concrete examples: imagining the noise impact of change taking place in a neighbourhood, like replacing an old factory with a park; the creation of a road, a pedestrian path, or a green infrastructure. For this project, the LAE is comparing its acoustic models with field measurements taken in three districts of Paris, Marseilles and Toulouse. So, don’t be surprised if you see researchers walking around with sound level metres on their backs, surveying your street! With all of this research, IFSTTAR is on the frontline, making our cities more sustainable. With a dual objective: to better preserve the environment in urban areas and to improve townspeople’s quality of living.

IMPROVING TOWNSPEOPLE’S QUALITY OF LIVING

(3) The ANR 2010-2013 project, coordinated by the Institute for Research on Urban Sciences and Techniques (IRSTIV), incorporating about ten partners.

(4) The ANR 2012-2016 project, coordinated by the University of Toulouse II, incorporating about ten partners.

TRACKING POLLUTANTS IN RAINWATER

At the Observatory of Urban Environment of Nantes (Onevu), IFSTTAR researchers are studying the pollutants present in urban rain waters (hydrocarbons, heavy metals, herbicides, etc.), along with the factors influencing their presence: sources of pollution, water route and flow, local weather conditions, etc.

The chemistry unit at IFSTTAR’s Water and Environment Laboratory (LEE) in Nantes allows one to measure many of these pollutants. Moreover, it has specialized in measuring certain emerging pollutants present in very small quantities in the urban environment (platinum, palladium, rhodium, etc.). The hydrologists in this laboratory are also studying the role of green infrastructures on the water cycle in cities, as part of the ANR VegDUD project, in order to better characterise their environmental impacts. The thermal and moisture performances are assessed with targeted measurements on certain works (gutter linings and green roofs) and with models at the neighbourhood or conglomeration level.

(5) See Trajectoire #5, pp.7-10, April 2013.
IFSTTAR NETWORKS
DATA USERS

With the network project Belgrand, IFSTTAR is facilitating exchange and sharing of knowledge between research units on the subject of urban problems.

Finding all of the data from research begun several years ago, or sharing the tools for processing it with partners, is the purpose of the Belgrand GEBD project (Equipment for Using Databases). Olivier Bonin, researcher at the City, Mobility and Transport Laboratory (LVMT) and Co-Director of the project, explains: “This project, supported by IFSTTAR, was born out of the will to create a network of research unit partners wanting to share information, and make all of their methodological and practical knowledge easily accessible.” To that end, IFSTTAR specifically chose to work with the IGN, Lab’Urba (Laboratory of Urban Planning at Paris-Est University) and, more generally, with the teams of Urban Futures LABEX. The shared data, both public and private, currently relates to the city and mobility. “We wish to expand them to all of the Humanities and Social Sciences, as well as the Environment,” specifies Jean-Paul Hubert, Research Director for the Economic and Social Dynamics of Transport Laboratory (DEST) at IFSTTAR. He is also Co-Director of the Belgrand project. An author would be able to enter the data from any research, along with the related publications, into a database, itself integrated into a global network: the dataverses network. Another platform will allow one to search for projects and publications using keywords. At the users’ request, new tools can be created following the example of a route calculation module (which calculates the shortest route between a group of points in France) developed by the Institute for Research on Urban Sciences and Techniques (IRSTV) in Nantes.

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“When IFSTTAR proposed it to us, it seemed logical to us to agree to participate in this network of exchanges dedicated to cities, mobility and the environment. Olivier Bonin had worked in our laboratory, and thus was quite familiar with our areas of research. This network is a privileged operational network in which we can exchange information about methods, use the data produced within the framework of our research by enhancing it with that of our partners, and share our respective tools. For example, we plan to combine the data produced with IFSTTAR with those of the telephone operator Orange and the city of Paris, for a modelling project of the city (called iSpace&Time), integrating actual pedestrian and vehicle traffic. In this way, we hope to aid decision makers in better seeing the city, before planning future installations.”

(1) http://belgrand-gebdl.ifsttar.fr

JULIEN PERRET is a researcher at IGN’s Geomatics and Cartographic Research Laboratory in Saint-Mandé.
IFSTTAR’s ambition is to improve the quality of life and the safety of citizens in the fields of transport and urban development. To cover this vast area of multidisciplinary research, the Institute has built a perennial framework, making it possible to ensure the continuity of the research undertaken before the merger of LCPC and INRETS, and to encourage the renewal of skills and knowledge. The five scientific departments (see inset) created at the beginning of the year are already hard at work. This new organization is the culmination of a long process of dialogue, which initially enlisted all the laboratories to build a 10-year scientific strategy. Approved in June 2012, it defines the Institute’s roadmap for research and establishes four key challenges: to invent sustainable mobility; to adapt the infrastructures; to bring natural hazards and environmental impacts under control; to conceive and design cities and territories. This close-knit organisation of research in 5 departments also makes it possible to facilitate the Institute’s scientific activities.

At the crossroads of disciplines
Each department organisation includes laboratories, mixed research units (UMR) and emerging teams. IFSTTAR’s principal asset resides in the mixing of the disciplines: sciences for the engineer, information and communication technologies, social sciences and humanities, life sciences, and systematically taking human factors into account. This encounter between challenges and skills should allow IFSTTAR to better meet its long-term goals.

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<td><strong>Challenge 4:</strong> To conceive and plan sustainable cities and territories: systemic and multi-scaled approaches.</td>
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Interview with Daniel Weisz-Patrault

Doctoral student at the Navier Laboratory, a mixed unit of IFSTTAR, École des Ponts ParisTech and CNRS in Marne-la-Vallée, Daniel Weisz-Patrault obtained his PhD thesis in December 2012 on the use of analytical methods applied to the sector of the metallurgy. Since then, he continues to reinvigorate this field of mathematics in the eyes of the industrial world.

WHAT LED YOU TO STUDY THIS SUBJECT?
I started the École des Ponts ParisTech in 2006, with the intention of working for a civil engineering firm specializing in architecture. After having completed a Master’s degree at École d’architecture de la ville et des territoires in Marne-la-Vallée, I had an internship in shaping curved glass for the Louis Vuitton Foundation. I realized that research interested me much more than the civil engineering and architecture. I then changed direction and enrolled in a Master’s degree in mechanical engineering research. And in 2010, Alain Ehrlacher, Director of the Mechanical Engineering Department at Ponts ParisTech, and researcher at the Navier Laboratory, suggested that I apply analytical methods to applications interesting ArcelorMittal.

WHAT WERE THE NATURE OF YOUR WORK FOR THIS COMPANY?
ArcelorMittal is the world leader in lamination, which consists of warping a steel sheet between two revolving cylinders. The company wanted to know the thermal effects, and the compressive and sheer stresses on the sheet’s surface, in order to understand the wear on its tools and the effectiveness of the process. As this cannot be done with surface sensors, manufacturers make evaluations using inverse models (often digital), which interpret measurements of elastic and temperature strain. These algorithms are often imprecise within extreme conditions such as lamination. I proceeded differently, by taking into account the elastic strain and the temperature measured by sensors inside the cylinders. I then progressively prolonged the solution of the equation towards the surface. Using this analytical resolution inverse method, I obtained constraints and thermal effects in contact with the steel sheet, without damaging it.

WHAT HAVE YOU CONTRIBUTED TO THE WORLD OF METALLURGY?
To start with, it caused a renewed interest in analytical methods, a disciplinary field little used by the industrial world and engineers, because it’s unfit for solving all of the problems. My thesis made it possible to show that, in certain cases, these approaches produce much better results than digital techniques, with many fewer variations. We thus noted that the heat flows in contact with the sheets and cylinders are not constant as we thought, but transform variably according to the local contact stress. From now on, ArcelorMittal can evaluate the thermal fatigue of its cylinders better. The company will develop sensors for pressure and temperature control to equip its production lines, in partnership with several European laboratories.

WILL YOU CONTINUE YOUR RESEARCH IN THIS SECTOR?
After my thesis, which I defended in only a little over two years, I went to the Institute of Mathematics and Physics in Weimar, Germany, for a few months, to deepen a result of my thesis. I am now planning to continue post-Doctoral research, again at the Navier Laboratory, and still in partnership with ArcelorMittal, which has renewed its confidence concerning other problems involving lamination cylinders.

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Reduce the number of road accident victims by 50% by 2020

To achieve this ambitious objective, the Expert Committee, chaired by Bernard Laumon, was created on the initiative of the National Council for Road Safety (CNSR) last February. Its proposals will be revealed at the end of November.

The 17 members of the Expert Committee, of which six are IFSTTAR collaborators, primarily have the task of advising, and of providing their expert testimony to the CNSR through four commissions. The latter are currently working on the following subjects: young people and road literacy; alcohol, narcotics and speed; two-wheelers and motorized two-wheelers; technological tools and road infrastructure.

Moreover, a far-reaching limited assignment was entrusted to the Committee, specifies Bernard Laumon: “The president of the CNSR, Armand Jung, asked us to produce a strategic plan intending to reduce the number of victims on roads from 4,000, to less than 2,000, by 2020.” That also includes those seriously injured, in that it is often the same factors that lead to death or long-term consequences and handicaps. The natural tendency of reducing road mortality – a consequence of improvements in vehicles, infrastructure and user behaviour – would, however, not make it possible to achieve the desired goal.

Using international scientific literature as a springboard, the Committee identified a hundred measures, then selected some of them for their usefulness and the possibility of their immediate application. “We would like to provoke breaches in the situation quickly, such as that which occurred in 2002 with the major presidential engineering projects of Jacques Chirac, in which the establishment of speed-reducing measures had significantly contributed to decreasing road traffic death rate by 40%,” he adds. An initial report submitted at the end of September by the Committee will be made public on November 29th, at a CNSR full board meeting; also an opportunity to publicise the general outlines of a second report currently being developed.

YVES PAGE,
Expert in accident analysis for Renault, member of the Expert Committee.

HOW WOULD YOU DESCRIBE YOUR PARTICIPATION ON THE EXPERT COMMITTEE?
The contribution of each participant, recognized for his expertise and not for his membership in such-and-such organisation, is based solely on our performance, which is producing scientific knowledge. Each provides the documentation that he himself has produced, and proposals for effective actions that are quickly applicable, suggested to the CNSR, which will then submit them to the government. The composition of this Committee, with one-third of its members from IFSTTAR, proves that the institute is a major and unavoidable research actor in the sector of road safety in France.

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How are our buildings vulnerable to earthquakes?

Vulnérabilité sismique des constructions is an overview of scientific publications that explains how to estimate the vulnerability of a structure, whether it be a building or a bridge, in zones of moderate seismicity, like France and Switzerland, as well as of strong seismicity, like Italy and Greece.

“The collapse of buildings kills people, not the intensity of the earthquakes,” cautions Philippe Guéguen, seismology expert at the Institute of Earth Science (ISTerre) in Grenoble. He led this collective work, published in April 2013, part of a series of treatises on mechanical and materials engineering. Calculating the seismic vulnerability of buildings is essential, as much for choosing to reinforce an old building, or for building new constructions, as for organizing relief efforts. “The goal was to gather together a collection of evaluation practices on the seismic vulnerability of buildings. I asked authors in Greece, Italy, France and Switzerland to speak about various zones, from moderate to high seismic risk.” The accuracy of the observations was verified through a system of review, a critical second reading by other engineers and seismology experts.

340 PAGES OF RECENT RESEARCH

After five chapters covering different methods of calculating vulnerability (empirical and mechanical methods; hybrid, experimental and digital methods), a more probabilistic approach, more linked to financial expenses (cost of living, repairs, etc., as calculated by insurers) is presented by a Swiss researcher. The book concludes on the vulnerability of bridges, with examples from around the world. “The methods presented by the Greek researcher Andreas Kappos and our team in Grenoble are probably the most original parts of the book: the mixture of empirical, mechanical and experimental approaches making it possible to fill in the gaps in knowledge and data. These are innovating approaches that we must explore further.” The target audience for this publication is academic (students and researchers). It might also be of interest to engineering firms, manufacturers, insurers, and the politicians who work on seismic risk.

(1) ISTerre is a joint research unit (CNRS, University Joseph Fournier, University of Savoie, IRD and IFSTTAR).

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Jean-Bernard Kovarik, Deputy Director General for Infrastructure, Transport and Sea (DGITM) for the MEDDE, chairs the Management Committee of the TRA 2014 (Transport Research Arena), a major meeting for European research and innovation on transport, that will be held from April 14th to April 17th, 2014, at Paris-La Défense.

“MAKING OUR MOBILITY SOLUTIONS MORE EFFECTIVE, AND TAKING CARE OF OUR NATIONAL INFRASTRUCTURE”

Would you be able to tell us more about the DGITM and the nature of its relationship with IFSTTAR?

The MEDDE’s headquarters administration bureau, the DGITM develops and implements the direction of the public policies in the areas of land and maritime transport of passengers and goods. IFSTTAR’s strategic approaches respond effectively to these challenges. With the onset of changes in ecology and energy, it’s a matter of rendering our mobility solutions more effective, and taking care of our national infrastructure. We are convinced of the importance of, and the need for, including research within the creation of public policy. In fact, subjects such as risk management, low carbon materials, security of infrastructures and transportation systems are what the French actually expect in terms of reliability, of quality of service, or security of “daily transport” for all modes of transportation.

What’s at stake for the TRA 2014?

The TRA is much more than a scientific colloquium. This event is a major crossroads of research and innovation in which 3,000 participants will be brought face-to-face next April: researchers, manufacturers, and drafters of public policy, from all over Europe and elsewhere. It will be an opportunity to put our heads together on ways in which scientific and technological activities, and transport policies will contribute to the competitiveness of firms, people’s well being, and the development of society. Consequently, the TRA 2014 Steering Committee gathers together representatives from the European Road Transport Research Advisory Council (ERTRAC), the European Rail Research Advisory Council (ERRAC), maritime and inland waterways (Waterborne Technology Platform), the Conference of the European Directors of Roads (CEDR), and the European Commission, as well as representatives from France.

How does this French edition distinguish itself from the previous ones?

While ensuring the continuity of the previous editions, the TRA 2014 already presents its ambition to develop the expansion and the influence of this biannual gathering, in order to make it a landmark event concerning transport in Europe. The slogan is: “Innovate mobility, mobilise innovation”. In Athens for the “transfer of power” to France during closing ceremony of the TRA 2012, the DGITM chose IFSTTAR to organize the event. The Institute is actually active in many research partnership actions, and by virtue of its positioning at the heart of a highly-developed network of technical and research organizations, has all the required expertise to make the TRA 5th edition a great success.