AMSE-Conference : MS'10 Prague June 23, 2010

RESEARCH-COOPERATION within AMSE

Invited panelists: P. Burrascano (Terni-Italia) Chairperson; N.P. Dewangan (Raipur-India), P. Stemberk (Prague-Czech Republic), T. Tsubaki (Yokohama-Japan), S.K. Das (Jamshedpur-India), T. Hara (Tokuyama-Japan)

P. Burrascano

A conference is the context to exchange our research results. While maintaining this main finality, AMSE Conferences have some specific characteristics that can help us to go a further step on: They cover a relatively wide spectrum of competences, there is a stable "core" group of researchers who participate. We can start from these observations to give an additional mission to AMSE and to the Conferences it organizes: this consolidated group of researchers can be the basis for further cooperation steps.

Bilateral agreements can be created to develop specific research projects by means of (i) facility sharing; (ii) exchange of students and researchers. For example, the university of Perugia-Terni, Italy, is active in this direction along with the Government Engineering in Raipur, India, and with the Czech Technical University in Prague, Czech Republic.

On the basis of the results of these consolidated research actions the access to international research funding programs can be considered.

In order to move in this direction we must better know our facilities, share a common "space" in which we can propose cooperative actions and exchanges. A major strength comes by exchanging students and researchers

This exchange power should be an addition to AMSE mission. EXCHANGE should be the master word in a "Give and Take system", and AMSE can play its part in it.

I propose here to give AMSE this new additional feature characteristic and dedicate to this aspect a specific page of the AMSE website.

N.P. Dewangan

The following two examples illustrate the indisputable and outstanding results of the fruitful cooperation as a result of participation in the AMSE International Conference.

The one which came out with the visit of Dr Petr Stemberk to my Engineering Institute in Raipur, state Chhattisgarh, India. After the AMSE Conference in Trivandrum, India, in December 2009, Dr Petr Stemberk delivered a seminar to the learned gathering of the town hall people and the engineers of the state government, more than 300 in numbers, in which the Governor of the Chhattisgarh state was the most distinguished audience.

Dr Stemberk, Civil Engineering Faculty, Czech Technical University in Prague, Czech Republic, deliberated on the theory, application, advantages and the restraints of recycling of the demolished concrete.

The Governor took a deep interest in the new technology of recycling of the concrete and while addressing the town hall, he issued an initiative for its use in the construction of a government building and said that he will personally visit the site and the construction.

The new techniques of the reuse of the demolished concrete were so powerful that there was a further initiative from the Governor office for the establishment of a research center on recycled concrete at my institute in collaboration with the Civil Engineering Faculty of the Czech Technical University, Prague, Czech Republic. The idea behind the Research Center is to have a continuous exchange of research works and growing relationship.

The other example came out while discussing the idea of cooperation with Prof. Pietro Burrascano, during AMSE conference in-Trivandrum. My institute is drafting an MOU with the University of Perugia, Terni, Italy, for broader scientific cooperation like exchange of researchers, students and results of research work, which is expected to be realized in near future.

These two examples have also set a new dimension in the AMSE International Conference. The AMSE conference is not only the place for presenting and discussing our research papers but a global platform for cooperation for mutual benefit and advancement

P. Stemberk

In reaction to what N.P. Dewangan said, it took only three meetings in person to establish an official cooperation between our schools. The involvement of the local authority, and in this case the top authority of Chhattisgarh State represented by the governor E.S.L. Narasimham, greatly expedited the process by showing the emphasis on N.P. Dewangan's initiative. It should be noted that the true purpose of the conferences in general, and in our case the AMSE conferences was fulfilled by this very tangible result of academic cooperation, which is related to reuse of demolition waste in construction.

The topic on the agenda of our school is the development of numerical models and experimental analysis of rammed earth structures. Especially, we are interested in cooperation on experimental work.

T. Tsubaki

One topic of our research area is the elaboration of a composite wall structure: the "sandwich structure", with two external layers and an internal layer between them. The project is the numerical simulation of this composite wall and we are looking for cooperation on the experimental testing. In particular exchange of information on the material of the internal layer is desired.

One of the objectives of this wall is the reduction of both the carbon dioxide emission (CO_2) and the energy consumption.

S.K. Das (India)

The rapidly increasing worldwide demand of the automotive, engineering and construction industries for advanced high-strength, high-ductility steels constitutes a strong market-pull for R&D in the steel and manufacturing industry. The design and implementation of new processes for these advanced materials involves interdisciplinary R&D efforts, in the fields of process development, casting, thermo-mechanical processing and structural engineering.

Multi-scale modelling is a critical tool in developing new paradigm for the design, processing and performance prediction of advanced materials including structural materials. It provides a linkage from the molecular level up to the property level and so permits the assessment of the effect of molecular changes on final properties. The microstructure and mechanical property prediction methodologies for thermo-mechanical processing, typically hot rolling of various grades of performance driven steel (such as, High strength low alloy steel(HSLA), Transformation induced plasticity(TRIP), Duel phase(DP) and Bainitic steel etc.) predominantly used in manufacturing sector exhibits strong empirical characteristics with corresponding drawbacks. This necessitates a systematic multi-scale simulation methodology for predicting the microstructure evolution, in which the empirical microstructural relationships are replaced by numerically efficient and accurate physics-based models at the mesoscopic / microscopic length scale. The proposed hierarchical multi-scale modelling approach will constitute an integrated framework, which combines molecular mechanics, mesoscopic microstructural algorithms with continuum-based macroscopic Finite Element Method (FEM) through a multi-scale modeling interface. Mechanical properties are the most important functions that are required in formed products. Multi-scale analysis of deformation processing, microstructure evolution in hot forming is the key tool usable for achieving customized mechanical properties of a formed product. The proposed approach is expected to overcome the shortcomings of current microstructure and mechanical property prediction practice employing empirical microstructural relationships, and to provide universal and accurate prediction capabilities.

International co-operation is invited from any interested researchers from academics, R&D laboratories and industry as well in the area of multi-scale modeling in materials. The scope is not limited to thermo-mechanical processing. It can be in the frontier areas, namely computational design of novel alloy systems, structural materials, advanced materials including composite materials, functionally graded and NANO materials.

T. Hara

Our problem is the evaluation of the ultimate strength of the R.C. shell; its structure contains non-linearity and we need numerical processing and experimental evaluation.

Our team is looking for cooperation with people having this kind of data and who simulate this structure. The shell structure is known, but expanded model, that will be utilized for the structural design, is needed.

Conclusion

This round table concerned mostly Civil Engineering and pointed out that teams have strength and weakness. They can offer help and also have needs.

For instance, Dr Stemberk's team can offer numerical structural analyses and is looking for data on rammed earth structures.

AMSE could be a resource to facilitate the exchanges, mostly with the conferences which are organized throughout the world. They are a place where people can meet and can exchange proposals; then e-mail contacts can continue the collaboration.

Civil engineering was a key topic of the AMSE and Czech Technical University in Prague; this example was taken to illustrate the Exchange concept and was used by the panelists. It is clear that the other fields are concerned and the frame seen above can be duplicated everywhere.