

Minutes of the 5th Meeting of the IASSAR Subcommittee on Computational Stochastic Mechanics during the ICOSSAR '97, Kyoto, Japan, Nov 25,1997, 7.00-10.00 p.m.

The Computational Stochastic Mechanics subcommittee of IASSAR met on November 27th during ICOSSAR-97 in Kyoto. Attending members were: Shinozuka, Schueller, Naess, Bergman, Spencer, Pradlwarter, Bucher, Haldar, Deodatis, Takada, Ghanem, Shiraki and Zhang. The meeting was chaired by Schueller with Ghanem taking the minutes.

First Schueller thanked all members for their contributions and excellent cooperation in preparing the state-of-the-art Report. The special Issue of PEM (Vol 12/4) just came out in time for ICOSSAR '97. Trying to solicit topics for discussion, he then suggested that for the next step, the committee breaks into two groups. One group would focus on parallel processing and the other group on Monte Carlo simulation.

Ghanem added that a useful topic the committee may wish to look into the influence stochastic computational methods should have on the development of new generation design codes. He added that he will provide a report to the committee at its next meeting.

A discussion ensued with regards to parallel computations. Bucher expressed a concern about the relevance of a potential contribution by the committee in that domain. Pradlwarter responded that a significant contribution could be in developing a formalism for parallel computations. Spencer added that the potential for contributions is questionable as these are highly hardware dependent. Schueller pointed out to the developments in deterministic computational mechanics indicating that the stochastic group should learn from those experiences and initiatives in parallel computing. Naess agreed stating that the effort should not be directed to the whole stochastic community, but only to those members of it who are interested in parallel computations. Schueller concurred confirming that the committee's effort would reflect the state of affairs within the committee, and could lead within a couple of years to a report or a survey. Shinozuka inquired about the nature of this survey, to which Schueller responded that it would be a survey to identify the potential of parallel algorithms. Everybody agreed that this is a worthwhile goal. At this point, Spencer suggested a workshop, or a tutorial, or a symposium to be held possibly at the University of Notre Dame in conjunction with the forthcoming Conference on Stochastic Dynamics. Shinozuka and Deodatis then suggested an exchange of experience regarding parallelization of stochastic codes, and Ghanem added that a useful contribution would be the identification of those procedures that have a high parallelization potential. Bergman then stated that his group's experience with MCS is that a serious bottleneck existed when parallel processing is used. He also suggested the exchange of expertise between the members via four or five page summaries. A discussion then ensued regarding the compilation of this information, either in the form of papers for a session at some forthcoming conference, or as an informative summary that the other members of the committee could use. Shinozuka encouraged the members to look at parallelization seriously and provide the committee with a useful and informative summary. He added that he thought parallelization was useful for problems that can be formulated in a mathematical form, such as pounding. Spencer added that his group has been able to solve many real problems very effectively, to which Shinozuka commented that some problems of interest

could not be parallelized, fragility curves being an example of such situations. In particular, Shinozuka pointed out that two recent earthquakes provided the community with large amounts of data that very few people were using. Moreover, he indicated many situations where several buildings, designed in accordance to the same design code, were subjected to the same earthquake. Some of the buildings collapsed while others did not. This classical fragility curve problem is very important. This is a major problem where probability is involved and where intensive computations are required. It is important to relate fragility curves to the age of the structures, as well as to the specific code used in designing them.

Summarizing, Schueller suggested that the group on Monte Carlo Simulation addresses the issue of developing fragility curves in addition to the development of efficient simulation algorithms. Deodatis, Shinozuka, Naess, Bergman, Spencer, Takada, and Pradlwarter will collaborate on this topic. The second group, on Parallel Computations had Schueller, Deodatis, Ghanem, Bergman, and Spencer as members. Members of this group would send in their contributions to Bergman, while Spencer would look further into the possibility of organizing a workshop on parallel computations.

The discussion was then steered to the "Computational Code Group". Ghanem justified his proposal for such a group by explaining that future codes should take into consideration the ready availability of sophisticated computational tools in stochastic mechanics. He added that it was up to this committee to take a leadership role in that direction. Shinozuka pointed out some of Shiraki's work on the relationship between the load factor design and the variability in the reliability index β . Haldar added that the load factor design evolved based on the concept of members' reliability and not system's reliability. and that the ramifications of this concept could be investigated by the group. Ghanem, Bucher, Haldar, Deodatis, Takada, Zhang, and Shiraki volunteered as members of the third group, on Computational Codified Design.

Spencer and Bergman were assigned to manage the parallel processing group, Deodatis and Pradlwarter were assigned to manage MCS group, with Deodatis leading the effort on the fragility curve component while Pradlwarter leading the effort on the algorithm portion. Ghanem was assigned to manage the third group.

Shinozuka then announced that the Journal of Probabilistic Engineering Mechanics would be very receptive and encouraging to scholastic review articles.

It was proposed by the Chairman to hold the next meeting in Santorini during the Conference on Computational Stochastic Mechanics, and to hold another meeting at the University of Notre Dame during the Stochastic Dynamics Conference.

All agreed.

The meeting was then adjourned.