

Book review

D.J. Ewins and D.J. Inman, eds. Structural Dynamics @ 2000: Current Status & Future Directions. Research Studies Press, Ltd., Baldock, Hertfordshire, England, 2001. ISBN 0-86380-251-6.

Let me start from the very end, that usually sums up a review: This is a beautiful book that ought to be read by all structural dynamists, unless he or she is in such an "elevated" position that stopped reading other scientists' papers and books. Even in such a case, this book may have a profound influence on the readers, at least who will venture to browse through it, for it has a nontraditional flavor. Naturally, the magic number of the 2000 years (since which structural dynamic event, one may ask?) is a good time to pause, think what has been done, and try to prognosticate what should be done in the next 10, 50, 100, 500, or even 1000 years. Still, Bertrand Russell warns us, "to predict is difficult, especially the future". Engineers like difficult tasks; hence this book was produced.

It must be said that my review cannot be totally unbiased. As editors write, "in the very early days, Frank Fahy, Isaac Elishakoff and Sam Ibrahim were all participants on the stormy sessions . . . that gave free rein to even more innovative ideas than those finally adopted for the actual meeting" that took place in April 1999 in Los Alamos. The objective of the meeting was "to conduct a rigorous review of the subject and to make a critical self-assessment of where "we" are, where we need to be, and how we proceed in order to get there". A critical self-assessment almost sounds as "self-criticism" adopted in some countries during their Cultural Revolutions. Still there is less self-assessment but a description of what has been accomplished.

A cynic among us can say that naturally, one can conduct such a meeting any time, and entitle it say "Structural Dynamics in Future 1000 Years". Still it is quite instructive to ask such provocative questions and provide even partial answers.

The result is the collection of nine essays on structural dynamics, eleven state of the art reviews, followed by questions, discussions and challenges beyond the year 2000.

The book is preceded by the introduction, dealing with origins, concepts, and plans, and is concluded by the chapter "The outcome of 2000". Both are written

by energetic editors, who are distinguished researchers in the field, who had to put quite a time in preparing this meeting of "a group of some 40 likeminded structural dynamists". This reviewer would have preferred 40 unlike-minded scientists, but then the task of integration the "outcome" would have been even greater, if at all achievable.

The chapter "The future of structural dynamics" was contributed by Professor Crandall. He makes following forecasts: "Structural Dynamics is presently, a strong and healthy niche technology. It cannot stand still, but must advance. I believe it will advance in depth as present techniques are improved and extended, and it will structure in breadth as it joins with the fields of control in accommodating smart structures and multifunctional systems". Chapters in this latter direction were contributed by Professors Inman ("Multifunctional Structures in the Next Millennium") and Schweitzer ("What Can Mechatronics Do for Structural Dynamics?"). In his essay "exciting vibrations" ("Exciting" referring to the satisfaction of tracing the source of the problem) Professor Ewins stresses several important ideas three of which are: "we should not confuse data with information", "distinction that should be clearly defined in the difference between validation and verification", "there are number of ways in which the theoretical predictions fall short of their mission".

It is pleasant to read, in this age of computer revolution, that the editors suggest "to accept that experimental techniques will continue to play a central role in the development of structures which are acceptable from the dynamics view point".

Dr. Farrar's chapter is entitled "Grand Challenges for Structural Dynamics". At least one topic must be mentioned here; it is introduced as follows: "The interest in the ability to monitor a structure and detect damage at the earliest possible stage is pervasive throughout the aerospace, civil and mechanical engineering communities."

One of the important ingredients of the conference was, as the editors write, "formulation of series of key questions that the various participants proposed as being those that needed to be addressed in the coming years". Here are examples: "Should deterministic or statistical models of structures be used for structures having high modal density?" (By Bucher); "How to

solve the old problem of damping prediction?" (By Caasar); "What criteria can be used to judge the usability of a model for a given application?" (By Cogan); "How should non-linearities on real structures be identified?" (By Cooper). It is a pity "older" participants did not pose questions.

It appears quite telling that the essays on structural dynamics started with the one on uncertainties (by Professor Bergman). Author concluded his presentation with valuable questions, one of which "Is the structural dynamist equipped to view the his/her world stochastically?" appears to be most intriguing. Hopefully author's future essays will provide more insights to this question.

Dr. Paez in his essay on random vibrations and reliability stresses that "stochastic finite element codes need to be made practical".

What next then? The editors thought on this problem too. They created a website www.sd2.org which provides a virtual forum. So, you and I can visit the website and see what is going on. The conference, its

participants, organizers, editors, and those who "created the germ of the idea" clearly represent "light onto structural dynamics". It is much hoped that this book will not be overlooked by busy theoreticians and practitioners. Rather, this book ought to become a focal point of the discussions on the future of structural dynamics, even if (and this can be most expected) you do not fully agree with its prognosis. This is an extremely important effort, and all those who were involved ought to be congratulated. My final word: Get this book, read it, agree with some of it, criticize some of it, and together let us move (forward) the subject of structural dynamics.

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