

# **Report on the 23rd International Modal Analysis Conference**

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I am grateful for the award of £600 from the Royal Academy of Engineering towards the cost of attending the 23rd International Modal Analysis Conference (2005), which took place in Orlando, USA. The conference encompassed all aspects of structural dynamics, with particularly strong themes of structural health monitoring (SHM), uncertainty modelling, model updating and experimental techniques amongst others.

I had decided that it was important for me to attend this leading conference in order to circulate my work, meet other researchers in similar fields, and collect new ideas and opinions. My current research consists of two strands: experimental modal testing of large aerospace structures, accompanied by finite element model updating; and the development of novel vibrometry techniques. The latter has potential applications in the former as well as for SHM and biomedical purposes. The advance publication of the technical program allowed an overview of the papers presented, and I was able to read around some SHM topics which were unfamiliar and promising. I attended the conference with 3 other university colleagues who were also presenting work. The conference ran with 7 parallel sessions; the scheduling was fortuitous in that owing to the range of topics, the experimental methods, SHM and laser vibrometry sessions were not exclusive. There was also a large exposition, well-attended by test equipment manufacturers, in which a variety of emerging techniques and instruments were showcased alongside more established hardware. In particular, a laser vibrometer based on photo-EMF sensors caught my attention, and following discussions with a sales engineer led me to subsequently investigate photo-EMF sensors for potential relevance to my ongoing research. There was also a non-contact vibrometer operating by measuring acoustic near-field air movement vectors, which I had not previously encountered.

My presentations were both given in the final session of the conference, although as such, were relatively well-attended. The first considered a comparative practical application of some sensor placement optimisation techniques. In subsequent discussion, I obtained a valuable reference to another technique, and as a result now have a more complete knowledge of the field. The second paper I presented described the application of a relatively new testing technique (INSET), which was not well known amongst the

attendees. It provoked interest and discussion as regards its theoretical and practical effectiveness: further elucidation was required for the requirements placed on the test equipment by the method. It is likely to be applied in future experimental work to gather more examples of its successful use, both by myself and by other participants. As a co-author of a third paper, I had been involved in generating a set of experimental data for uncertainty quantification methods. Through attending its presentation alongside a range of others in sessions on methods of managing uncertainty, this previously less-familiar field has become more widely understood.

Another less familiar field which was particularly interesting was that of applied structural health monitoring techniques. Many examples were provided, covering the spectrum from idealised lab-based rigs to in-service civil structures. While not presently involved in building such systems, understanding their demands and methodologies is important to my research into novel fibre sensors which might provide information for them. While processing the information from sensors for operational decision-making remains the hardest aspect of SHM, embedded fibre vibrometry expands the envelope of data measurement. There were a number of papers describing applications of laser vibrometry; an appreciation of the practical difficulties will be useful when I begin experimenting with techniques involving new vibrometer configurations.

My approach to my next major conference will be similar but perhaps with a shifted perspective as I will have been involved in more hands-on development of vibration sensor devices, and will most likely have practical issues to pursue rather than questions of general approach. Overall then, I feel I have achieved the original proposed objectives of attending the conference, and have several ideas to pursue.