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SYMPOSIUM REPORT

SYMPOSIUM ON FLUID–STRUCTURE INTERACTIONS, AEROELASTICITY, FLOW-INDUCED VIBRATION AND NOISE, HELD AT DALLAS, TX, 16–21 NOVEMBER, 1997

The Fourth International Symposium on Fluid–Structure Interactions, Aeroelasticity, Flow-Induced Vibration and Noise was held at Dallas, TX, during November 1997. These symposia have been held every four years since the first in the series, which was held in 1984. The central theme of the symposia has remained generally the same, but this year the scope was enlarged to include Aeroelasticity.

Approximately, 130 papers were presented at the Symposium over a six-day period, making this Symposium larger than any of its predecessors. The topics covered embraced an extremely wide range of applications, including numerical methods in fluid–structure interactions; bluff-body/flow interactions; nonlinear dynamics; identification schemes in fluid structure–interactions; fluid–sound and fluid–fluid interactions; axial flow and quiescent fluid fluid–structure interactions; basics of fluid–structure interactions in heat exchangers; heat exchanger vibration and wear; acoustical effects in heat exchangers; fluid–structure interactions with two-phase flows; fluid–structure interactions in pumps, valves and equipment; piping and hydraulics fluid–structure interactions; aerospace applications and aeroelasticity. Although the above topics may appear disparate, they all have one common theme in that they involve interactions between structural and fluid dynamics.

In a report such as this it is not possible to review any of the papers in detail, but some particular aspects of the Symposium that impressed this participant are as follows. Firstly, it is interesting to note the degree to which numerical simulation, and particularly computational fluid dynamics (CFD) is now being employed in the analysis of fluid–structure interaction problems. Certainly, the use of CFD for bluff-body problems lags behind its applications in aerospace and aeroelasticity; however, the use of CFD for the simulation of fluid flow around bluff bodies is increasing significantly Many of these simulations account for the moving boundary conditions due to the vibratory nature of the structural dynamics, a number consider the full three-dimensionality of the flow, and turbulence models are frequently employed. Although many of the numerical simulations appear very impressive, it is apparent that care must be used in their application, particularly for interacting bluff bodies in cross-flow. Of equal importance is the increased understanding of complex fluid-dynamic phenomena which has been obtained in the last few years via the use of advanced experimental techniques. In particular, a number of authors at the Symposium presented impressive examples of flow visualization. Another interesting aspect of the Symposium to this participant was the degree to which the fluid–structure-interactions community has embraced the expanding field of nonlinear dynamics. A number of papers presented at the Symposium examined some aspect of nonlinear dynamics in fluid–structure interactions.

In addition to the papers that dealt with the more fundamental aspects of fluid–structure interactions, there were a large number of presentations dealing specifically with real industrial problems. Although a significant percentage of these practical problems originate from heat exchangers, steam generators, valves and pumps, there are a number of equally challenging and interesting problems which come from a variety of other areas. Despite the advances made at the more fundamental level, it is sobering to realize that there are still a host of practical problems which remain largely unsolved. However, perhaps this is one of the reasons why the interest in this Symposium has grown over the years.

The Proceedings of the Symposium, published by ASME, appear in three volumes. Volumes I (Païdoussis *et al*., 1997a) and II (Païdoussis *et al*., 1997b) cover most aspects of the Symposium, while Vol. III (Friedmann & Païdoussis, 1997) is specifically on Aerospace Applications and

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Aeroelasticity. Certainly, these proceedings are recommended to anyone with an interest in any aspect of fluid–structure interactions.

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M.P. PAÏDOUSSIS *et al.* (eds) 1997a *Proceedings 4th International Symposium on Fluid–Structure Interactions, Aeroelasticity, Flow-Induced Vibrations and Noise* Volume I, AD-Vol. 53-1, 472 pp. New York: ASME. [This volume covers: (i) Numerical Methods in FSI; (ii) Bluff-body/flow interactions; (iii) Nonlinear dynamics; (iv) Identification schemes in FSI; and (v) Fluid-sound and fluid–structure interactions.]

M.P. PAÏDOUSSIS *et al.* (eds) 1997b *Proceedings 4th International Symposium on Fluid–Structure Interactions, Aeroelasticity, Flow-Induced Vibrations and Noise* Vol. II, AD-Vol. 53-2, 564 pp. New York: ASME. [This volume covers: (i) Axial flow and quiescent fluid FSI; (ii) Basics of FSI in heat-exchangers; (iii) Heat exchanger vibration and wear; (iv) Acoustical effects in heat exchangers; (v) FSI with two-phase flows; (vi) FSI in pumps, valves and equipment; and (vii) Piping and hydraulic FSI.]

P.P. FRIEDMANN & M.P. PAÏDOUSSIS (eds) 1997 *Proceedings 4th International Symposium on Fluid–Structure Interactions, Aeroelasticity, Flow-Induced Vibrations and Noise* Vol. III, AD-Vol. 53-3, 217 pp. New York: ASME. [This volume covers: Aerospace applications and Aeroelasticity.]