6th European Conference on Computational Mechanics (Solids, Structures and Coupled Problems) (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
June 11- 15, 2018, Glasgow, UK

ADVANCED NUMERICAL METHODS FOR THE MODELING OF COUPLED SYSTEMS DYNAMICS

A. LEGAY[*], A. ZILIAN[†], M. BUCHSCHMID[††] AND J.-F. DEÜ[*]

[*] Structural Mechanics and Coupled Systems Laboratory, Conservatoire National des Arts et Métiers
292 rue Saint-Martin, 75141 Paris Cedex 03, France
antoine.legay@lecnam.net and jean-francois.deu@cnam.fr

[†] Faculté des Sciences, de la Technologie et de la Communication, Université du Luxembourg
6, avenue de la Fonte, L-4364 Esch-sur-Alzette, Luxembourg
andreas.zilian@uni.lu

[††] Chair of Structural Mechanics, Technische Universität München
Arcisstr. 21, 80333 München, Germany
martin.buchschmid@tum.de

Key words: Structural dynamics, vibrations, coupled systems, reduced order models

ABSTRACT

Vibration of structures is of major importance for industrial applications. Most of the time, engineers need to reduce these vibrations for several reasons: comfort of users, protection of sensitive devices or fatigue of structures. These vibrating structures are mostly coupled to other physics or media leading coupled dynamical systems. Classically, structures can be coupled to (non-exhaustive list):

- fluids, such as for vibroacoustic problems;
- other solid bodies, such as solids of viscoelastic or porous materials;
- electric devices, for example through piezoelectric patches.

Engineers thus need to have both (1) predictive and (2) efficient numerical tools in order to design such systems. The aim of this mini-symposium is to gather researchers from both industry and academia in order to review recent advanced developments around two key points:

1. modeling of the involved multi-physic phenomena (including damping),
2. construction of efficient and reliable reduced order models of the coupled system.

REFERENCES

[1] L. Rouleau, J.-F. Deü, A. Legay. A comparison of model reduction techniques based on modal projection for structures with frequency-dependent damping. *Mechanical Systems and Signal Processing*, 90, 110-125, 2017.

[2] S. Ravi, A. Zilian. Numerical Modeling of Flow-Driven Piezoelectric Energy Harvesting Devices. *Computational Methods for Solids and Fluids*, in series *Computational Methods in Applied Sciences*, 41, 399-426, 2016

[3] G. Müller, M. Buchschmid. Hybrid approaches for vibroacoustical problems based on the finite element method and statistical energy analysis. *Wave Motion.* 51(4), 622-634, 2014.