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Preface

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Co-simulation is an effective and efficient approach to solving dynamics problems that span multiple domains and involve heterogeneous subsystems. It also enables the coupling of different solver tools with a minimal exchange of information in modular simulation environments. These features have made co-simulation an increasingly popular and widespread solution for the design and analysis of complex engineering applications. Multibody system dynamics provides an ideal framework for these multidisciplinary problems, serving at the same time as a high-fidelity approach for the description of mechanical systems and as a mid- to high-fidelity one for problems rooted in other domains. Co-simulation is a natural choice to recover high-fidelity capabilities in these additional domains, as well as a means of achieving high performance, including real-time execution, when dealing with complex multiphysics problems.

The practical use of co-simulation methods requires the selection of adequate strategies to obtain accurate and reliable results. This must be frequently achieved with limited information about how the numerical integration of the subsystems proceeds over time. The large array of co-simulation configuration options, as well as the wide variety of applications in which it can be used, have given rise to a multiplicity of approaches and methods to ensure that simulation predictions correspond faithfully to the behavior of the physical system being described. As a consequence, co-simulation has become an active area of research.

Different scientific meetings, such as COSIM 2021, an International Symposium on Co-Simulation and Solver Coupling in Dynamics, held online on May 24–25, 2021, provided a forum for the exchange of ideas regarding recent advances and developments in co-simulation and solver-coupling techniques. Following these meetings and the body of information put forward and discussed, it was decided to promote a thematic issue of Multibody System Dynamics to present state-of-the-art methods and applications of co-simulation and coupling techniques in which researchers propose advances in the field. Contributions

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from authors answering this call were received and, after a rigorous peer review, they are now presented in this special issue on Co-Simulation in Multibody System Dynamics which includes nine papers on novel solver coupling methods and applications of co-simulation.

We would like to thank the authors of these articles, as well as their reviewers and the editors in chief of the journal, who made this special issue possible.

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