

Numerical methods for fluid-structure interactions

In many engineering applications the dynamic interaction between flow and structure plays a key role in the efficiency and safety of a design. A classical example of a fatal interaction between a flow (the wind) and a structure (the bridge) is the Tacoma Narrows Bridge, which collapsed in 1940. Potentially dangerous fluid-structure interactions (FSI) also can occur in aircraft – e.g. wing flutter or buffeting – and wind turbine applications. Accurate prediction of the dynamic interaction of flows and structures is, therefore, of the utmost importance.

In the 1990s the numerical simulation of FSI started to take-off and has progressed to such an extent, that nowadays even flutter points of a complete F-16 fighter jet can be numerically obtained. However, simulation times are still too long to apply sophisticated numerical tools in a design phase. Therefore, improvements in numerical methods are required. In addition, benchmark cases to validate the accuracy and efficiency of the numerical methods are urgently required.

In this mini-symposium, papers are solicited that contribute to the state-of-the-art of numerical methods for fluid-structure interactions. Both improvements for monolithic (both systems at once) as well as partitioned solution methods for flow and structure are welcome. Both coupling techniques in space (information transfer from flow to structure and vice versa) as well as coupling in time can be discussed. In addition, well-documented benchmark problems and results for those are welcome as well. Finally, interesting FSI applications, including a validation and verification effort, can be submitted.