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Titel des Beitrags:
A partitioned solution approach for the fluid-structure interaction of wind and thin-walled structures.

Abstract:
In many engineering applications two or more different interacting systems require the numerical solution of so-called multifield problems. In civil engineering the interaction of fluid and structures plays an important role, i.e. for fabric tensile structures of light and flexible materials often used for large roof systems, capacious umbrellas, tents, canopies or pavillions. Whereas powerful numerical simulation techniques have been established in structural engineering as well as in fluid mechanics, only relatively few approaches to simulate the interaction of fluids with civil engineering constructions have been presented. To determine the wind loads on complex structures, it is still state-of-the-art to apply semi-empirical, strongly simplifying methods or to perform expensive experiments in wind tunnels. In this paper an approach of a coupled fluid-structure simulation will be presented for membrane and thin shell structures. The interaction is described by the structural deformation as response to wind forces, resulting in a modification of the fluid flow domain. Besides a realistic determination of the wind loads, information on the structural stability can be obtained. The paper is organized as follows: Section 2 includes some remarks concerning the applied simulation codes integrated in a coupled application which is described in the third section. The partitioned solution approach realized by a so-called frame algorithm for controlling the simulation process and transferring the grid based data is focused in section 4. An application for quasi static explicit coupling is presented in section 5.

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