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Simulation of the structural response of a cable immersed in a uniform flow: comparison of three different methodologies[1] BRUNO CARMO, RAFAEL GIORIA, ALESSANDRO LIMA, JULIO MENEGHINI, University of Sao Paulo — The structural response of slender structures immersed in a fluid flow are very difficult to predict and costly to calculate because of the nonlinear nature of the flow-structure interaction. The search for less expensive, but yet sufficiently accurate methodologies to carry out these calculations has been subject of intense research in the last decades, mainly due to interest of offshore engineering companies. Here we present a comparison of three different methodologies that can be used to predict the structural response of a flexible cable immersed in a uniform flow. The first is the so-called strip approach, in which two-dimensional simulations of the flow at different points along the cable axis are coupled through the cable motion. In the second approach, the flow simulation is three-dimensional considering only domains of few diameters in the spanwise direction, distributed along the cable axis and coupled through the cable displacements. The third is the full three-dimensional calculation of the cable response, considering the entire flow field. We compare the results obtained for a few different Reynolds numbers and cable tensions, analyzing both the accuracy of the results and computational cost.

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Bruno Carmo
University of Sao Paulo

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