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Topology Optimization of Fluid-structure Interaction Problems: the TOBS Method Approach SHAHIN RANJBARZADEH, Department of Mechatronic and Mechanical Systems University of Sao Paulo Brazil, RENATO PICELLI, Polytechnic School University of Sao Paulo Brazil, RAGHAVENDRA SIVAPURAM, Structural Engineering, University of California, San Diego, EMILIO CARLOS NELLI SILVA, Department of Mechatronic and Mechanical Systems University of Sao Paulo Brazil — This work presents a coupled topology optimization methodology for minimizing the compliance energy of a structure composed of a metal or polymer strip located in a fluid flow channel. The methodology proposed here aims to apply the Topology Optimization of Binary Structure (TOBS) method to seek for the optimum layout of the structure. This is achieved using COMSOL Multiphysics Live link with MATLAB. The steady state fluid-structure and sensitivity analyses are carried out in COMSOL. The TOBS method is implemented in MATLAB to obtain the optimized topology configuration of the structure. A number of numerical examples is presented to validate the optimization procedure and to demonstrate the effectiveness of the implemented algorithm. Also, key parameters, e.g. fluid velocity at the inlet, Young's modulus of the solid material and structure aspect ratio are investigated.

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