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Feasibility of using Hybrid Wavelet Collocation - Brinkman Penalization Method for Shape and Topology Optimization OLEG V. VASILYEV, University of Colorado at Boulder, MATTIA GAZZOLA, PETROS KOUMOUTSAKOS, Swiss Federal Institute of Technology Zurich, Switzerland — In this talk we discuss preliminary results for the use of hybrid wavelet collocation - Brinkman penalization approach for shape and topology optimization of fluid flows. Adaptive wavelet collocation method tackles the problem of efficiently resolving a fluid flow on a dynamically adaptive computational grid in complex geometries (where grid resolution varies both in space and time), while Brinkman volume penalization allows easy variation of flow geometry without using body-fitted meshes by simply changing the shape of the penalization region. The use of Brinkman volume penalization approach allow seamless transition from shape to topology optimization by combining it with level set approach and increasing the size of the optimization space. The approach is demonstrated for shape optimization of a variety of fluid flows by optimizing single cost function (time averaged Drag coefficient) using covariance matrix adaptation (CMA) evolutionary algorithm.

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