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POD- and RB-Hierarchical Model Reduction Techniques in a Parametrized Setting

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Different methods have been proposed in the scientific panorama to offer a compromise between modeling accuracy and computational efficiency. Reduced order models represent a widespread solution in such a direction. In this presentation, we focus on the Hierarchical Model (HiMod) reduction technique, which proved to be an effective approach to discretize CFD configurations where a principal horizontal dynamics overwhelms the transverse ones (e.g., when modeling hemodynamics or signal propagation in waveguides). In particular, we address the generalization of the HiMod procedure to a parametrized setting. We propose two alternative approaches, which combine HiMod with Proper Orthogonal Decomposition (POD) and the Reduced Basis (RB) method, respectively. The two strategies will be analyzed and cross-compared in order to identify the associated pros and cons.

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