

Mathematics and Fluid Mechanics

Flow around a cylinder: a model order reduction study

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The identification of flow structures, when performing numerical simulations of fluid flows, especially in transient problems, is a complex task, since such structures change in time and move along the domain. Decomposing the entire data set into smaller sets, important structures present in the main flow and structures with periodic behaviour, like vortices, can be identified. In this work, we propose the decomposition of the von Kármán vortex street into a generator base, and using a Model Order Reduction specifically, a Proper Orthogonal Decomposition we analysed the flow of Newtonian and complex fluids around a cylinder. By grouping specific modes, a reconstruction is performed and the identification of complex structures is obtained.