Abstract Submitted
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Network-based representation of energy transfer in unsteady separated flow[1] ADITYA NAIR, KUNIHIKO TAIRA, Florida State University — We construct a network-based representation of energy pathways in unsteady separated flows using a POD-Galerkin projection model. In this formulation, we regard the POD modes as the network nodes and the energy transfer between the modes as the network edges. Based on the energy transfer analysis performed by Noack *et al.* (2008), edge weights are characterized on the interaction graph. As an example, we examine the energy transfer within the two-dimensional incompressible flow over a circular cylinder. In particular, we analyze the energy pathways involved in flow transition from the unstable symmetric steady state to periodic shedding cycle. The growth of perturbation energy over the network is examined to highlight key features of flow physics and to determine how the energy transfer can be influenced. Furthermore, we implement closed-loop flow control on the POD-Galerkin model to alter the energy interaction path and modify the global behavior of the wake dynamics. The insights gained will be used to perform further network analysis on fluid flows with added complexity.

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