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Modal Structures in flow past a cylinder MOHAMMAD MURSHED, University of Michigan, Ann Arbor — With the advent of data, there have been opportunities to apply formalism to detect patterns or simple relations. For instance, a phenomenon can be defined through a partial differential equation which may not be very useful right away, whereas a formula for the evolution of a primary variable may be interpreted quite easily. Having access to data is not enough to move on since doing advanced linear algebra can put strain on the way computations are being done. A canonical problem in the field of aerodynamics is the transient flow past a cylinder where the viscosity can be adjusted to set the Reynolds number (Re). We observe the effect of the critical Re on the certain modes of behavior in time scale. A 2D-velocity field works as an input to analyze the modal structure of the flow using the Proper Orthogonal Decomposition and Koopman Mode/Dynamic Mode Decomposition. This will enable prediction of the solution further in time (taking into account the dependence on Re) and help us evaluate and discuss the associated error in the mechanism.

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