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**Evolution of Recurrent Coherent Structures in a Minimal Channel** PARITOSH MOKHASI, DIETMAR REMPFER, IIT, Chicago — Many classes of turbulent flows, including wall-bounded turbulence, are known to exhibit organized behavior in the form of coherent structures underneath their chaos and nonlinearity. One of the current methods to detect organized flow phenomena is the method of Proper Orthogonal Decomposition (POD). POD enables us to decompose flow fields into a set of basis functions and coefficients such that they provide a compact and finite-dimensional representation of an infinite- dimensional system. In this talk, we look at a relatively new method for identifying the evolution of coherent structures that exhibit temporal periodicity. The method of episodic POD is an extension of standard POD, wherein flow realizations are grouped together based on a specified time scale to create a modified ensemble such that each member of the ensemble consists of a group of realizations. Application of POD analysis to this new ensemble leads to the construction of spatio-temporal POD eigenfunctions called "episodic modes." By appropriately selecting the time scale, the first episodic mode represents the most dominant recurrent behavior in the flow. It is shown that the most dominant spatio-temporal coherent structure arises from the spanwise variation of the streamwise component of the velocity. Qualitative analysis on the turbulent statistics seems to suggest the presence of some form of self-sustaining process.

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