

Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Search for local low dimension in transitional flow behind a bed form EDUARDO RAMOS, Max Planck Institute Physics of Complex Systems, PEDRO GUIDO, JORGE ROJAS, National University of Mexico, HOLGER KANTZ, Max Planck Institute Physics of Complex Systems — We study experimentally the dynamics of vortices formed behind a bed form in an open channel flow. The Reynolds number is 453 which corresponds to transition flow. On the lee side of the bed form, vortical structures are generated, deformed and shed with no apparent identifiable regularity or predictable shape. This phenomenon is interpreted as a spatiotemporal chaotic system. We determine regions of low dimensionality in this flow by adapting the method Local Bred Vectors originally proposed by Patil et al. (Phys Rev Lett 2001) to analyze the atmosphere. In contrast to the original proposal, with our method no theoretical model is required. Then, we correlate the local dimension field with the predictability of specific regions of the flow. To this end, we use a forecast strategy similar to that described in Kantz and Ragwitz (Int. J. Bif. Chaos 2005). The methodology of the analysis described is general and not restricted to the flow behind a bed form.

Eduardo Ramos
Max Planck Institute Physics of Complex Systems

Date submitted: 02 Aug 2006

Electronic form version 1.4