Heteroclinic and Homoclinic Connections in a Kolmogorov-Like Flow\textsuperscript{1} BALACHANDRA SURI, Institute of Science and Technology, Austria, RAVI KUMAR PALLANTLA, LOGAN KAGEORGE, MICHAEL F. SCHATZ, ROMAN O. GRIGORIEV, Georgia Institute of Technology, USA — Recent studies suggest that unstable recurrent solutions of the Navier-Stokes equation provide new insights into dynamics of turbulent flows. In this study, we compute an extensive network of dynamical connections between such solutions in a weakly turbulent quasi-two-dimensional Kolmogorov flow that lies in the inversion-symmetric subspace. In particular, we find numerous isolated heteroclinic connections between different types of solutions – equilibria, periodic, and quasi-periodic orbits – as well as continua of connections forming higher-dimensional connecting manifolds. We also compute a homoclinic connection of a periodic orbit and provide strong evidence that the associated homoclinic tangle forms the chaotic repeller that underpins transient turbulence in the symmetric subspace.

\textsuperscript{1}National Science Foundation Grants: CMMI-1234436, DMS-1125302, CMMI-1725587. Defense Advanced Research Projects Agency grant HR0011-16-2-0033