Generic bi-Lyapunov stable classes for flows

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The study of chain recurrence classes has been a central topic within the Palis program of understanding the dynamics of a generic set of dynamical systems. This is specially the case for diffeomorphisms and flows in the C1 topology, where powerful perturbations techniques are available. In this direction, R. Potrie has studied how to obtain global properties of a class when it is saturated by stable/unstable manifolds. He showed that a C1 generic bi-Lyapunov stable homoclinic class for a diffeormorphism admits a dominated splitting. In this work, we treat the same problem in the context of flows, where an extra difficulty appears from the presence of singularities accumulated by recurrent regular orbits. Our main result proves that open and densely in the C1 topology the chain recurrent class of a singularity does not contain both its stable and unstable manifold. Our proof involves a careful study of the periodic orbits which bifurcates near the singularity. As a consequence of the main result, we obtain that a C1 generic bi-Lyapunov stable chain recurrence class has no singularities and thus has a dominated splitting for the Linear Poincar flow. We also extend the results of R. Potrie for Lyapunov stable homoclinic classes with a dissipative periodic point, which may have a singularity. This is a joint work with Adriana da Luz and Christian Bonatti.