Helicity and linking numbers for 3-dimensional Anosov flows

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Abstract:

On a closed 3-manifold, the helicity of a volume-preserving flow is an invariant originally used for solving variational problems in magnetohydrodynamics. Helicity was introduced by Moffatt, who indicated that it measures the total amount of linking of flow trajectories. Later, Arnol'd and Vogel proved that, when the manifold has the real homology of a 3-sphere, helicity can be evaluated in terms of the linking numbers of knots constructed by closing up flow trajectories with geodesic arcs. In this talk I will describe recent work (joint with Richard Sharp) where, without the homology assumption on the manifold, we characterise the helicity of Anosov flows in terms of weighted averages of linking numbers of periodic orbits.