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Symbolic dynamics applied to a numerical simulation of a perturbed Hill's spherical vortex. JOSHUA ARENSON, SPENCER SMITH, KEVIN MITCHELL, University of California Merced — In the classic Hill's spherical vortex flow an invariant sphere prevents material inside the vortex from mixing with material outside. Here, we apply an additional shear and rotational flow to break the symmetry of the vortex, thereby allowing mixing of the material inside and outside. The resulting system exhibits fully 3D chaotic advection. We consider the scattering of passive tracers that are drawn into and then ejected from the vortex. Here we focus on the numerical computation of fractal scattering functions–the time trapped within the vortex as a function of two impact parameters. We then compare the fractal self-similarity of these scattering functions to those predicted by 3D homotopic lobe dynamics–a new symbolic method of describing topological dynamics.

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