Heteroclinic trefoil knot in the Lorenz Equations: a computer assisted proof

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Abstract

I'll discuss a certain co-dimension two bifurcation in the Lorenz equations known as a T-point. This is a situation where the one dimensional stable/unstable manifolds of the three equilibrium solutions intersect in a particular way, and its existence has interesting dynamical implications. Since a T-point involves the intersections of one-dimensional curves for a three-dimensional vector field, two parameters must be adjusted for this to happen. The first such bifurcation occurs far from any perturbative regime, hence it is difficult to prove using pen and paper techniques. I will discuss a computer assisted proof building on the Parameterization Method of Cabre, Fontich, and de la Llave. This is joint work with Sheldon Newhouse.