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Validated numerics for collision dynamics in the circular restricted three body problem

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The circular restricted three body problem studies the dynamics of an infinitesimal particle moving in the gravitational field two large primary bodies orbiting on Keplerian circles. The problem has a rich history going back to Poincare and has inspired many novel method for computer assisted analysis. Computational arguments are especially valuable when working far from any perturbative regime. I will discuss some recent work on validated numerics for periodic, homoclinic, and heteroclinic solutions which pass very near – perhaps even passing through – a collision with one or both of the primary bodies. This work combines classical techniques for regularizing singularities with some more recent techniques for rigorous advection of analytic curves and validated numerics for analytic invariant manifolds.

This is joint work with Shane Kepley and Maciej Capinski.

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