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Small divisors in the n -vortex filament problem

Abstract:

We consider a model for n near-parallel vortex filaments in a three dimensional fluid that takes into consideration the pairwise interaction between the filaments along with an approximation for motion by self-induction. The same system of equations appears in the description of vortex filaments in the Gross-Pitaevski model of Bose-Einstein condensates. In this talk we discuss families of standing waves for a pair of vortex filaments with the same or opposite circulation. For the co-rotating pair, the main technique is a Nash-Moser method applied to a Lyapunov-Schmidt reduction that gives rise to a family of solutions over a Cantor set of parameters, while for the counter-rotating pair the contraction mapping theorem gives rise to an infinite number of curves of solutions with constant rational frequencies.