Vorticity topology of vortex pair interactions at low Reynolds numbers - DTU Orbit
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**Vorticity topology of vortex pair interactions at low Reynolds numbers**

We investigate vortex merging at low Reynolds numbers from a topological point of view. We identify vortices as local extremal points of vorticity and follow the motion and bifurcation of these points as time progresses. We consider both two-dimensional simulations of the vorticity transport equation and an analytical study of the core growth model. The merging process of identical vortices is shown to occur through a pitchfork bifurcation and for asymmetric vortices one vortex merges with a saddle through a cusp (perturbed pitchfork) bifurcation. Excellent agreement between the core growth model and the numerical simulations is observed. For higher Reynolds numbers, filamentation becomes dominant hence limiting the predictive value of the core growth model. A complete investigation of merging in the core growth model is conducted for all possible vortex strengths. Simple, analytical expressions are derived for bifurcation curves, merging time, and vortex positions depending on systems parameters.

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