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Buoyancy-driven flow around $A + B \rightarrow C$ reaction fronts propagating in Hele-Shaw cells: Parabolic flights experiments and numerical simulations LAURENCE RONGY, Non Linear Physical Chemistry Unit, Universite Libre de Bruxelles (ULB), KERSTIN ECKERT, Institute of Fluid Mechanics, Technische Universitat Dresden, ANNE DE WIT, Non Linear Physical Chemistry Unit, Universite Libre de Bruxelles (ULB) — The dynamics of $A + B \rightarrow C$ reaction fronts is studied under modulated gravitational acceleration by means of a combination of parabolic flight experiments and numerical simulations. During modulated gravity the front position undergoes periodic modulation with an accelerated front propagation under hyper-gravity together with a slowing down under low gravity. The underlying reason for this is an amplification and a decay respectively, of the buoyancy-driven double vortex associated with the front propagation under standard gravitational acceleration, as explained by reaction-diffusion-convection simulations of an $A + B \rightarrow C$ front propagating in a thin layer. Deeper insights into the correlation between grey-value changes in the experimental shadowgraph images and characteristic changes in the concentration profiles are obtained by a numerical simulation of the imaging process.

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