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Effect of radial advection on chemical fronts

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The reaction-diffusion-advection properties of chemical fronts are studied both theoretically and experimentally in the case where one reactant is injected radially into the other reactant at a constant flow rate. At long times or equivalently large radius from the injection point, the properties of one-dimensional reaction-diffusion fronts are recovered as the influence of the advection field decreases radially. However, at early times i.e. for a smaller radius, advection plays a crucial role. We characterize the influence in this transient regime of the injection flow rate and of the ratio of initial concentration of both reactants on the position of the front, the reaction rate and the amount of product generated. We discuss the role of the kinetics of the reaction on the possible accessible regimes. We confirm experimentally the theoretical predictions in polar geometries using either simple A+B->C reactions or the autocatalytic chlorite-tetrathionate reaction.

Participation

In-Person

References

A. Comolli, A. De Wit, F. Brau, “Dynamics of A + B ⟶ C reaction fronts under radial advection in a Poiseuille flow”, Phys. Rev. E 104, 044206 (2021).
F. Brau, A. De Wit, “Influence of rectilinear vs radial advection on the yield of A + B ⟶ C reaction fronts: A comparison”, J. Chem. Phys. 152, 054716 (2020).

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