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Pinning of reaction fronts by moving vortices[1] JUSTIN WINOKUR[2], GARRETT O'MALLEY, TOM SOLOMON, Bucknell University — We present experimental and numerical studies of the effects of moving vortices on the propagation of reaction fronts. The front is produced by the excitable Belousov-Zhabotinsky chemical reaction, and the flow is forced with a magnetohydrodynamic technique. An individual vortex or vortex pair moving in the same direction as a front often pins and drags the front, with a maximum pinning speed that depends on the strength of the vortex. In an extended system, the moving vortex leaves a wake-like structure that dramatically affects the overall front. Multiple pinning vortices leave a pattern of wakes that combine to form more complicated front structures. We extend these experiments to random patterns of vortices which produce complicated pinned fronts whose detailed structure depends on the speed of the vortices relative to the background fluid. The experiments are complemented by numerical simulations that simplifies the large-scale behavior by modelling moving vortices as pinning centers.

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