Abstract Submitted
for the OSF17 Meeting of
The American Physical Society

Effects of advection on the Belousov-Zhabotinsky reaction: standing excitation waves in a quasi-1D system[1] CHASE FULLER, NIKLAS MANZ, The College of Wooster — Reaction-diffusion (RD) waves are autocatalytic reaction zones that propagate via molecular diffusion without mass transport. They arise from the interplay of nonlinear reaction kinetics of an activator and an inhibitor species and diffusion-mediated spatial coupling (e.g., action potentials in nerves, forest fires, or stadium waves). Introducing fluid flow in a liquid chemical RD system has a huge effect on the propagation behavior of the wave. By using quasi-1D systems, such as glass capillary tubes, it is possible to create 'standing waves' by advecting the liquid solution opposite to the direction of wave propagation. In our experiments, we used the Belousov-Zhabotinsky reaction as the liquid RD system. The solution was restrained in capillaries, with inner diameters of 0.58 mm. This enabled us to study a quasi-1D reaction-diffusion-advection system. After initiating waves on the open end of the capillary, the reaction solution was advected in the opposite direction. The effect of flow rate on the propagation speed and front shape was investigated. Stationary chemical waves were observed under equal-velocity conditions.

[1]NSF Grant DMR-1560093

Chase Fuller
The College of Wooster

Date submitted: 01 Oct 2017 Electronic form version 1.4