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The Effect of Obstacles on the Propagation Speed of Reaction-Diffusion Waves VINCENT W.H. HUI, JOHN F. LINDNER, NIKLAS MANZ, The College of Wooster — This project investigated the effect of obstacles within a narrow channel on the propagation speed of reaction-diffusion waves. We used an objective-C program to solve the Tyson-Fife model, with two coupled partial differential equations, to simulate the behavior of these waves. Values for the activator and inhibitor's diffusion coefficients and the excitability variables were chosen to correspond with the nonlinear chemical Belousov-Zhabotinsky reaction. We will present the following results: i) The concentration wave slowed down when passing around obstacles, due to the increased curvature of the wave front. It then slowly returned to its original speed, while the front was straightened again. ii) The average propagation speed, through a defined length of the channel, decreased when the obstacles (rhombuses and ellipses) became larger (size to channel-width ratio) or more vertically oriented (width-to-height radio). iii) The average speed decreased with increasing number of obstacles in the channel. iv) Using a constant number of obstacles, the average speed decreased with more evenly distributed obstacles compared to a dense row of obstacles followed by an uninterrupted channel.

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