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Reaction-diffusion around concave, spiral, fractal & soft obstacles
YANG YU, NIKLAS MANZ, JOHN LINDNER, Physics Department, The College of Wooster, SHERMAN-FAIRCHILD TEAM — We study the behavior of wavefronts colliding with different concave fractals, spirals, and Perlin noise simulations in two-dimensional channels using finite-difference numerical integration based on Tyson-Fife reduction of the Oregonator model of the Belousov-Zhabotinsky reaction. We study the influence of obstacles shapes on the wavefronts behaviors by plotting wavefront time versus left most point of the wave and delay versus time with obstacles on different angles and generations. We find that wavefronts behave the same when it goes through symmetric obstacles (for example, Hilbert curve and Sierpinski carpet). Due to the plot of vanish time versus generation of the obstacles, we predict that the vanish time will go to infinity. By changing the diffusion equation, we make the diffusion constant a function of space and the reaction constant a function of the light sensitive parameter ϕ. We build animations that a piece of wave is trapped in the obstacle, which generates periodic motion.

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