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*Wave blocking phenomenon, a dynamical
systems approach*

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Abstract

Traveling waves are an intricate part of many physical phenomena such as electrical impulses in nervous tissue and cardiac muscle, many chemical reactions and the action potential in certain types of conductors. The problem of propagation failure of such waves due to various perturbations, also known as wave blocking, remains a relatively elusive concept that is nevertheless observed in experiments. Some model specific research has been conducted on the subject, most of which utilizes numerical tools. The object of this talk is to adopt a symmetry based approach to obtain results that are much more general. We study the effect of a symmetry breaking perturbation acting on an ODE with translational symmetry, modeling a traveling wave. We show that for a large class of such systems, the wave blocking phenomenon can be explained by the presence of saddle-node bifurcations of solutions on a carefully chosen invariant curve. We achieve this by using symmetry reduction tools as well as properties of center manifolds.