

Abstract Submitted
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Clusters of decelerations of heart rate appear to be a Hopf bifurcation, and provide early warning of illness in premature infants ABIGAIL FLOWER, Biophysics, University of Virginia, RANDALL MOORMAN, DOUGLAS LAKE, Internal Medicine, U. Virginia, JOHN DELOS, Physics, William and Mary — The pacemaking system of the heart is complex; a healthy heart constantly integrates and responds to extracardiac signals, resulting in highly complex heart rate patterns with a great deal of variability. In the laboratory and in some pathological or age-related states, however, dynamics can show reduced complexity that is more readily described and modeled. Reduced heart rate complexity has both clinical and dynamical significance – it may provide warning of impending illness or clues about the dynamics of the heart’s pacemaking system. Here we describe uniquely simple and interesting heart rate dynamics observed in premature human infants - reversible transitions to large-amplitude periodic oscillations. We propose a mathematical interpretation based on Hopf bifurcation theory. (Supported by NIGMS, by the National Heart, Lung, and Blood Institute, and by NSF, with computing support provided by William and Mary.)

John Delos
William and Mary

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