Journal of Control Science and Engineering

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Journal of Control Science and Engineering
Volume 2008 (2008), Article ID 641847, 14 pages
doi:10.1155/2008/641847

Abstract
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Research Article

Adaptive Output Tracking of Driven Oscillators

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Received 1 August 2007; Revised 13 May 2008; Accepted 1 August 2008

Academic Editor: Jing Sun

Abstract

Heart dynamics are usually unknown and require the application of real-time control technique because of the fatal nature of most cardiac arrhythmias. The problem of controlling the heart dynamics in a real-time manner is formulated as an adaptive learning output-tracking problem. For a class of nonlinear dynamic systems with unknown nonlinearities and nonaffine control input, a Lyapunov-based technique is used to develop a control law. An adaptive learning algorithm is exploited that guarantees the stability of the closed-loop system and convergence of the output tracking error to an adjustable neighborhood of the origin. In addition, good approximation of the unknown nonlinearities is also achieved by incorporating a persistent exciting signal in the parameter update law. The effectiveness of the proposed method is demonstrated by an application to a cardiac conduction system modelled by two coupled driven oscillators.