

学术报告会

时间: 2012年8月8日(周三) 10:00-11:00

地点: 电院群楼2-410会议室

A Hybrid Neural Network Model Predictive Control with Zone Penalty Weights for Type 1 Diabetes Mellitus

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Abstract:

In this work, a hybrid neural network model is developed to predict and control the blood glucose (BG) of the patient who has type 1 diabetes mellitus (T1DM). The proposed model consists of two parts: a linear finite impulse response (FIR) model and a nonlinear autoregressive exogenous input (NARX) network. The key features of the resulting hybrid model are that it reveals satisfactory accuracy of long-term prediction and does not require immeasurable state for model initialization. The developed hybrid model is then embedded in a nonlinear model predictive control (MPC) controller with zone penalty weights, and this closed-loop controller is implemented on these virtual subjects for simulation-based preclinical testing. The results show that promising glycemic control performance can be achieved. Moreover, this overall BG control methodology is easily portable and has the ability to arbitrarily start the therapeutic control at any initial point.

Biography:

Prof. Hsiao-Ping Huang served in NTU as instructor since 1970 and became associated professor and full professor in 1976 and 1980. He was also appointed as the head of department during the years from 1986 till 1992. Currently, he is a Professor Emeritus in the Department of Chemical Engineering. In 1998, he joined the editorial board as an associated editor of the Journal of Process Control (abbr. JPC), and, in 2006, the Asia/Australasia Regional Editor till now. He is one of the founding pioneers of the PSE Asia conference and became the Chairman of the conference in 2002. He was also the President of APCCHE 2010. Serving to the local chemical engineering communities, he was in charge of Chemical Engineering research projects in the National Science Council, Taiwan (1996-2000), the ChE projects of SBIR from MOEA (Ministry of Economic Affairs, Taiwan) in 2002-2003, and the chief in 2003.