

عنوان مقاله:

Fuzzy Model Predictive Control to Control the Depth of Anesthesia in the Presence of Uncertainty Caused by Variable Heart Beat Rate

محل انتشار:

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خلاصه مقاله:

It is highly desirable to control anesthesia in terms of its depth and the medicine used during it. Since manual injection gives rise to human errors in the control of depth of anesthesia (DOA) which may cause physical and financial risks, it is highly desirable to automate the process of injection of drug in anesthesia. In this study, novel fuzzy predictive controller is used to control the DOA of a patient. A multiple-input single-output (MISO) compartmental model is used to describe patient. Propofol and Remifentanil with key features of being hypnotic and analgesic are used for the induction and maintenance of anesthesia. Bispectral index (BIS) is determined as a criterion for the DOA of a patient and is achieved through the electroencephalogram signal. One objective of this study is to investigate the influence of uncertainty due to variable heart rate on the patient's DOA. Finally, with the help of MATLAB software, predictive control strategy is applied on a virtual set of three patients with different parameters and is compared with the conventional PID controller. The performances of the controllers on nominal patient with irregular variable heart rate are analyzed. The experiments show that the predictive controller keeps the BIS around the set point well.

کلمات کلیدی:

Fuzzy predictive control, Identification, Anesthesia, Bispectral index (BIS), Compartmental model (PKPD), Variable (heart rate, Depth of Anesthesia (DOA)

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