

عنوان مقاله:

Fractional Order Glucose Insulin System Using Fractional Back-Stepping Sliding Mode Control

محل انتشار:

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خلاصه مقاله:

In this paper, based on a fractional order Bergman minimal model, a robust strategy for regulation of blood glucose in type 1 diabetic patients is presented. Glucose/insulin concentration in the patient body is controlled through the injection under the patients skin by the pump. Many various controllers for this system have been proposed in the literature. However, most of them have consider the system as an integer order system. Moreover, the majority of the presented methods suffer from an important disadvantage that is long settling time of the control system. Thus, the contribution of this paper in comparison with previous related works is presenting a fractional back-stepping sliding mode control that considerably reduces the required time for glucose to reach its desired level. Due to the sliding mode design, the proposed controller is robust against external disturbances. Due to the back-stepping design, convergence of each state variable of the system to its desired value can be guaranteed separately. Simulation results .verify the satisfactory performance of the proposed controller

کلمات کلیدی:

Fractional order control, sliding mode control, back-stepping design, blood glucose regulation, Fractional Bergman minimal model, Lyapunov fractional

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