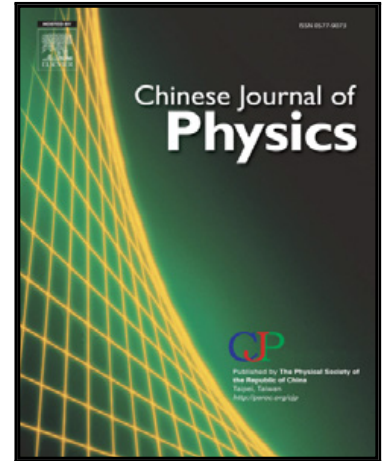


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Controllability and Observability of Glucose Insulin Glucagon System in Humans

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Highlights

- An approach is used for artificial pancreas to control Type 1 diabetes mellitus.
- Composite model and its extension were used for feedback design controller.
- Glucagon affects the safety of artificial pancreas to overcome the risk of hyperglycemia.
- Progress of artificial pancreas for control loop system was studied for GIG pump.

ABSTRACT

Artificial pancreas is one of the solutions to control the type1 diabetes mellitus now days. Efforts are being made to develop the artificial pancreas. The controllability and observability of the glucose insulin glucagon dynamical model is calculated which is the modified form of composite model of glucose insulin glucagon dynamics for type 1 diabetes mellitus is considered. The concept of controllability and observability for the linearized control system is used to design a feedback control. This model completely describes the glucagon affects the safety of artificial pancreas to overcome the risk of hyperglycemia. Composite model of glucagon-glucose dynamics and its extension is treated for type 1 diabetes mellitus to check the linear controllability and observability. Two cases are discussed on the basis of input of the system. For case I, insulin as the only input and glucose as an output and in case II insulin and glucagon as

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