عنوان مقاله:

Hybrid direct fuzzy quantum control design for a class of quantum stochastic systems and its application in pairs trading strategy

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خلاصه مقاله:

In this paper, a new hybrid direct fuzzy quantum control is designed for a class of quantum stochastic systems where the dynamics of the state variable are prescribed via a Quantum Stochastic Differential Equation (QSDE) with respect to a quantum Brownian motion on a quantum probability space. The presented control is comprised of two parts, an adaptive fuzzy control part that performs the main control action and a quantum-fuzzy control part that is implemented when the existence and uniqueness of the solution are not established. Thereby, the adjusted laws of the control parameters and the quantum-fuzzy rules are designed via the Lyapunov-based technique such that the stability of the system is guaranteed. One theorem for facilitating the Fuzzy controller design algorithm is presented and proved. The proposed control method enhances the applicability of the quantum stochastic control theory for many practical control problems such as portfolio management. Therefore, theoretical results are illustrated by simulating the pairs trading problem. According to simulation results, the performance of the pairs trading strategy is improved as an increasing return portfolio that is controlled by the proposed method.

کلمات کلیدی:

Quantum stochastic differential equation, Fuzzy Controller, Quantum Brownian motion, Quantum probability space, Pairs trading strategy