

عنوان مقاله:

Backstepping-based fault-tolerant control of a robotic manipulator actuated by shape memory alloy

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خلاصه مقاله:

This study focuses on the practical implementation of a passive fault-tolerant controller designed for a robotic manipulator under the actuation of shape memory alloy (SMA). The nonlinear behavior of SMA, due to hysteresis effects, brings complexity to the mathematical model of the robotic system, resulting in an increase in its degree of freedom. To address this issue, a reduced-order model is employed for designing the controller. In the design of the control method, a backstepping controller is initially developed for the manipulator actuated by SMA. However, it was observed that the performance of the proposed control is reduced in the presence of sudden faults. To ensure that the robotic system can continue to operate effectively even in the presence of faults, a passive fault-tolerant control strategy based on backstepping was introduced to handle additive and multiplicative faults occurring in the robotic manipulator. The experimental results demonstrate the improved performance of the proposed fault-tolerant controller in the presence of faults

کلمات کلیدی:

.Passive fault tolerant control, Robotic manipulator, Shape memory alloy, Backstepping controller

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