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Fault diagnosis and fault-tolerant control of uncertain robot manipulators using high-order sliding mode. (English) [Zbl 1400.93214](#)

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Summary: A robust fault diagnosis and fault-tolerant control (FTC) system for uncertain robot manipulators without joint velocity measurement is presented. The actuator faults and robot manipulator component faults are considered. The proposed scheme is designed via an active fault-tolerant control strategy by combining a fault diagnosis scheme based on a super-twisting third-order sliding mode (STW-TOSM) observer with a robust super-twisting second-order sliding mode (STW-SOSM) controller. Compared to the existing FTC methods, the proposed FTC method can accommodate not only faults but also uncertainties, and it does not require a velocity measurement. In addition, because the proposed scheme is designed based on the high-order sliding mode (HOSM) observer/controller strategy, it exhibits fast convergence, high accuracy, and less chattering. Finally, computer simulation results for a PUMA560 robot are obtained to verify the effectiveness of the proposed strategy.

MSC:

- [93C85](#) Automated systems (robots, etc.) in control theory
- [70E60](#) Robot dynamics and control of rigid bodies
- [93B12](#) Variable structure systems
- [94C12](#) Fault detection; testing in circuits and networks

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