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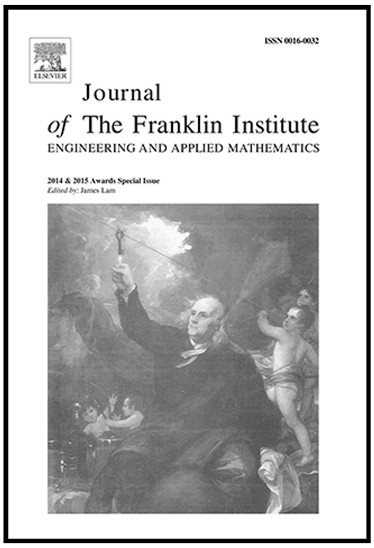

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Finite-time fault-tolerant coordination control for multiple Euler-Lagrange systems in obstacle environments

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Abstract

In obstacle environments, the problem of coordination tracking control for a team of Euler-Lagrange systems is investigated under modeling uncertainties, actuator faults and disturbances. First, syncretizing the Null-Space-based Behavioral (NSB) control, graph theory and finite-time control method, a novel desired velocity is predesigned to achieve the finite-time obstacle avoidance and coordination tracking. Then a set of finite-time fault-tolerant coordination control laws (FFCCLs) are presented to guarantee all of the agents to track a dynamic target while avoiding obstacles/collisions. To improve the robustness and control accuracy of the systems, an adaptive control gain is incorporated into the FFCCL so that the derived algorithm can be implemented without manual parameter adjustment. Both of the control architectures are distributed, model-independent and robust with respect to modeling uncertainties, actuator faults and disturbances. Finally, several numerical simulations are presented to demonstrate the efficacy of the control strategies, showing that the overall motion of the two tasks can be accomplished satisfactorily with high precision.
Keywords: Distributed coordination control, obstacle avoidance, fault-tolerant

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