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短文

一种船队编队控制的backstepping 方法

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摘要:

针对多船舶之间的协同合作问题, 对船舶的编队控制进行了研究. 通过运用领航者-跟随者方法, 选择在Cartesian 坐标系下建立新的船队编队控制模型, 基于这种模型, 利用反步技术和李亚普诺夫理论设计了一种可使船队按期望队形航行的船队编队控制器. 通过考虑领队船舶与跟随船舶的航向角误差, 保证了跟随船舶航向角的稳定性, 从而避免其在航行过程中不断振荡. 最后对所设计的控制方法的正确性及有效性进行了仿真验证.

关键词: 欠驱动船舶; 编队控制; 领航者-跟随者; 反步法

Formation control for ship fleet based on backstepping

Abstract:

The problem of formation control of ship fleet is studied. Under Cartesian coordinates, a model for ship formation control is established. Based on backstepping technique and Lyapunov direct method, a controller for formation control of ships fleet is designed by utilizing leader-follower approach. By using the designed control method, the ship fleet can navigate in the desired formations. Considering heading angle errors between leader and follower ships, the stability of the heading angle of follower ship is guaranteed to avoid vibrating follower ship under sail. Numerical simulations show the correctness and effectiveness of the proposed controller.

Keywords: underactuated ship; formation control; leader-follower; backstepping technique

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