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基于约束人工势场法的弹载飞行器实时避障航迹规划

Real-time obstacle avoidance trajectory planning for missile borne air vehicle based on constrained artificial potential field method

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中文关键词: [弹载飞行器](#) [实时避障](#) [航迹规划](#) [约束人工势场法](#) [高度调节势场](#)

英文关键词: [missile borne air vehicle](#) [real-time obstacle avoidance](#) [trajectory planning](#) [constrained artificial potential field method](#) [height adjust potential field](#)

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作者	单位
王伟	北京航空航天大学 宇航学院, 北京 100191
王华	北京航空航天大学 宇航学院, 北京 100191

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中文摘要:

针对弹载飞行器飞行高度低、需实时避障的需求, 提出了一种三维约束人工势场法用于弹载飞行器的实时避障航迹规划. 该方法将人工势场法扩展到三维空间, 增加了一个势场函数——高度调节势场函数, 并将弹载飞行器的动力学约束条件引入人工势场法中. 该方法继承了传统人工势场法计算速度快、占用内存少的优点, 并能保证所规划航迹的可飞性. 仿真结果显示约束人工势场法相比于传统人工势场法, 具有以下优势: 所规划的航迹更具有可飞性; 可明显减弱在障碍物附近的抖动现象; 可显著改善在狭窄通道中的摆动现象; 不易陷入局部最小点.

英文摘要:

A three-dimensional constrained artificial potential field method was proposed for planning of real-time obstacle avoidance trajectory for the missile-borne air vehicle, due to the low altitude and needing real-time obstacle avoidance. Combined with a potential field—height adjust potential field and the dynamic constraints of the missile-borne air vehicle, the artificial potential field method was extended to three-dimensional space. The new method not only inherited the advantages of fast calculation and less memory, but also could ensure the flight performance of planning trajectory for the missile-borne air vehicle. The simulation results show that the constrained artificial field method has the following advantages compared with the traditional artificial potential field method: the planning trajectory presents flight performance; the swing phenomenon near the obstacle is significantly reduced; the oscillatory phenomenon in narrow passage is significantly improved; it is easier to escape from the local minimum point.

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