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直升机旋翼下洗气流对排气喷流的影响

Effects of helicopter rotor downwash air flow on exhaust plume flow

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中文摘要:

采用数值模拟方法, 对旋翼下洗气流作用下的排气喷流流动特征进行了研究, 分析了旋翼下洗气流速度和排气喷口方向对排气喷流流动以及排气系统引射能力的影响. 研究表明: 排气喷流受到旋翼下洗气流的作用而发生明显的向后机身下方以及旋翼转动方向的偏转, 其偏转程度随旋翼下洗气流速度的增大而加剧; 当排气喷口向上排气时, 排气喷流在旋翼下洗气流作用下的偏转能够形成对后机身表面的撞击, 排气系统的引射能力有微弱的降低, 引射系数减小约0.01; 而当排气喷口斜向上或侧向时, 排气喷流对后机身未形成撞击, 引射能力得到了一定程度的提升, 引射系数最大增大0.12.

英文摘要:

The exhaust plume flow characteristics subjecting to the action of helicopter rotor downwash air flow were investigated based on CFD numerical calculations. And the effects of rotor downwash air flow velocity and exhaust direction on the exhaust plume flow and pumping capacity of the exhaust system were analyzed. Results show that: exhaust plume yields flow strong downward deflection to the rear fuselage, as well as deflection to the rotor rotational direction; under the action of rotor downwash air flow, these deflections are especially obvious under higher rotor downwash air flow; when the exhaust is ejected upwards, the exhaust plume flow could come into collision with rear fuselage; pumping capacity of the exhaust system is weakened slightly and pumping coefficient decreases approximately 0.01; while the exhaust is ejected obliquely or laterally, the exhaust plume flow do not come into collision with rear fuselage; pumping capacities of the exhaust system are somewhat enhanced and pumping coefficient increases maximally 0.12.

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