

绕水翼初生空化涡的实验观测

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摘要 对绕2D水翼无分离流边界层内的初生空化形态进行了实验研究. 采用高速摄像机观测了空化初生结构的形态, 应用2D-LDV测量了空化初生时翼型周围的流动速度分布, 并对实验结果进行了分析. 结果表明: 绕水翼无分离边界层内, 初生空化结构中空泡伴随着近壁湍流拟序结构的发生而出现, 在初生空化条件下, 形成空化涡结构, 大量的微空泡产生于发夹涡结构中, 并在涡结构的猝发过程中出现生成---长大---溃灭---反弹---再溃灭的过程. 初生空化涡结构具有空泡和近壁拟序结构双重特性.

关键词 [水翼,空化初生,拟序结构,2D-LDV,空化涡](#)

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Experimental observations of inception cavitation vortices around a hydrofoils

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Abstract

The inception cavitation around a 2D-hydrofoil in the boundary layer of a non-separated turbulent flow was studied experimentally. The cavitation inceptions were observed by a high speed video camera, and the velocities around the hydrofoil were measured by a 2D-LDV. It is shown that the inception cavitation bubbles are generated along with a hairpin-shaped vortex coherent structure in the boundary layer of the non-separated turbulent flow. The developing process of an inception cavitation bubble vortice comprises generation, expanding, collapse, rebound and re-collapse. It is concluded that the inception cavitation has dual characteristics of both bubbles and coherent structures.

Key words [hydrofoil](#) [inception cavitation](#) [coherent structures](#) [2D-LDV](#) [cavitation bubble vortices](#)

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