[1]蒋运华,安伟光,安 海.超空泡运动体水平面运动弹道特性研究[J].弹箭与制导学报,2012,6:117-120.

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超空泡运动体水平面运动弹道特性研究(PDF)

Title:	Trajectory Characteristics Study of Supercavitating Vehicles Moving in Horizontal Plane

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关键词： 超空泡运动体; 水平面运动; 稳定方案; 机动控制力; 弹道特性

Keywords: supercavitating vehicles; horizontal plane movement; stabilization scheme; maneuvering control forces; trajectory characteristics

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摘要： 为了研究超空泡运动体水平面运动特性,将六自由度运动解耦,建立了有倾斜无侧滑的运动方程。考虑重力稳定方案情况下,分析了超空泡运动体的受力特性。提出两种水平面机动控制力产生方案,一是两自由度空化器方案; 二是倾斜转弯方案。研究表明,采取重力稳定方案时,能保证运动体姿态及水平面弹道在扰动下不发散且以较小的幅值周期振荡。两自由度空化器的机动控制力产生效率高于倾斜转弯方案的效率。

Abstract: In order to study the horizontal motion characteristics of supercavitating vehicles(SV), the 6-DOF motion was decoupled and the dynamic equations of SV moving in horizontal plane with incline and un-sideslip were established. Considering the gravity stabilization scheme, the load characteristics of SV were analyzed. Two schemes of horizontal maneuvering control forces were advised, one is tow-DOF cavitator(TDOFC); The other is BTT. The results show that the vehicle gesture and horizontal plane trajectory aren't divergent and periodic oscillations with small amplitude under small disturbance when owned gravitational stability scheme. The maneuvering control forces generation efficiency of TDOFC is higher than BTT's.

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[1] Savchenko Yu N. Perspectives of the supercavitation flow applications[C]//International Conference on Innovative Approaches to Further Increase Speed of Fast Marine Vehicles, Moving Above, Under and in Water Surface, Saint-Petersburg, Russia, July 2-4, 2008.

[2] Lindau J W, Kunz R F, Mulherin J M, et al. Fully coupled, 6-DOF to URANS, modeling of cavitating flows around a supercavitating vehicle[C]//Fifth International Symposium on Cavitation(CAV2003)Osaka, Japan, November 1-4, 2003.

[3] Paryshev E V. Approximate mathematical models in high-speed hydrodynamics[J]. Journal of Engineering Mathematics, 2006, 55(1/4):41-64.

[4] Logvinivich G V. Hydrodynamics of flows with free boundaries[M]. English translation, New York: Halsted Press, 1973.

[5] Savchenko Yu N. Control of supercavitation flow and stability of supercavitating motion of bodies [C]//Paper Presented at the RTO AVT Lecture Series on "Supercavitating Flows", von Kármán Institute (VKI)in Brussels, Belgium, RTO EN-014, 12-16 February 2001.

[6] Semenenko V N. Dynamic processes of spercavitation and computer simulation[C]// Paper Presented at the RTO AVT Lecture Series on "Supercavitating Flows", von Kármán Institute(VKI)in Brussels,