

Application of the generalized quasi-complementar energy principle to the fluid-solid coupling problem(PDF)

《船舶与海洋工程学报》[ISSN:1002-2848/CN:61-1400/f] 期数: 2009年01 页码: 40-45 栏目: 出版日期: 2009-03-25

Title: Application of the generalized quasi-complementar energy principle to the fluid-solid coupling problem

作者: 梁立孚; 刘宗民; 郭庆勇

Author(s): LIANG Li-fu*; LIU Zong-min and GUO Qing-yong
College of Aerospace and Civil Engineering, Harbin Engineering University, Harbin 150001, China

关键词: fluid-solid coupling; elasto-dynamics; generalized quasi-complementary energy

分类号: -

DOI: -

文献标识码: A

摘要: The fluid-solid coupling theory, an interdisciplinary science between hydrodynamics and solid mechanics, is an important tool for response analysis and direct design of structures in naval architecture and ocean engineering. By applying the corresponding relations between generalized forces and generalized displacements, convolutions were performed between the basic equations of elasto-dynamics in the primary space and corresponding virtual quantities. The results were integrated and then added algebraically. In light of the fact that body forces and surface forces are both follower forces, the generalized quasi-complementary energy principle with two kinds of variables for an initial value problem is established in non-conservative systems. Using the generalized quasi-complementary energy principle to deal with the fluid-solid coupling problem and to analyze the dynamic response of structures, a method for using two kinds of variables simultaneously for calculation of force and displacement was derived.

导航/NAVIGATE

[本期目录/Table of Contents](#)

[下一篇/Next Article](#)

[上一篇/Previous Article](#)

工具/TOOLS

[引用本文的文章/References](#)

[下载 PDF/Download PDF\(269KB\)](#)

[立即打印本文/Print Now](#)

[推荐给朋友/Recommend](#)

统计/STATISTICS

[摘要浏览/Viewed](#) 380

[全文下载/Downloads](#) 277

[评论/Comments](#)



参考文献/REFERENCES

- [1] WU Yousheng, CUI Weicheng, YAN Kai. The new challenge on ship mechanics in 21st century[C]// Invited Lecture of Mechanics 2000 Academic Conference. Beijing: China Meteorological Press, 2000: 134-141(in Chinese).
- [2] LEIPHOLZ H. Direct variational methods and eigenvalue problems in engineering[M]. Leyden: Noordhoff International Publishing, 1977: 24-95.
- [3] LEIPHOLZ H. On some developments in direct methods of the calculus of variations[J]. Appl Mech Rev, 1987, 40(10): 1379-1392.
- [4] LIU Diankui, ZHANG Qihao. Some general variational principles for non-conservative problems in theory of elasticity[J]. Acta Mechanica Sinica, 1981, 23(6): 562-570(in Chinese).
- [5] LIANG Lifu, LIU Dianqui, SONG Haiyan. The generalized quasi-variational principles of non-conservative systems with two kinds of variables[J]. Science in China(G), 2005, 48(5): 600-613(in Chinese).
- [6] LIANG Lifu. Variational principles and applications[M]. Harbin: Harbin Engineering University Press, 2005: 106-115(in Chinese).
- [7] LIANG Lifu, HU Haichang. Generalized variational principle of three kinds of variables in general mechanics[J]. Science in China, 2001, 44(6): 770-776(in Chinese).
- [8] LIANG Lifu, LUO En, FENG Xiaojie. A variational principle form for initial value problems in analytical mechanics[J]. Chinese Journal of Theoretical and Applied Mechanics, 2007, 39(1): 106-111(in Chinese).
- [9] HYDROMECHANIK Z S. Ship Hydrodynamics[M]. Shanghai: Shanghai Jiao Tong University Press, 1997: 289-296(in Chinese).
- [10] WANG Xianfu. Marine air-

hydrofoils theory[M]. Beijing: National Defence Industry Press, 1998: 1-20(in Chinese). [11] GURTIN M E. Variational principles for elastodynamics[J]. Arch Rat Mech, 1964, 16: 34-50. [12] LUO En. Gurtin-type variational principles in linear elastodynamics[J]. Science in China(A), 1988, 31(3): 293-312(in Chinese).

备注/Memo: -

更新日期/Last Update: 2010-05-14