

中文力学类核心期刊
中国期刊方阵双效期刊
美国《工程索引》(EI Compendex)核心期刊(2002—2012)
中国高校优秀科技期刊

曾清红,孙文俊.轴对称几何下耦合MOF界面重构的多介质ALE方法[J].计算力学学报,2014,31(5):584~589

轴对称几何下耦合MOF界面重构的多介质ALE方法

Multi-material ALE method coupled with MOF interface reconstruction in axisymmetric geometry

投稿时间:2013-08-13 修订日期:2013-12-23

DOI: 10.7511/jslx201405007

中文关键词: [轴对称几何](#) [MOF界面重构](#) [多介质ALE方法](#) [混合网格](#)

英文关键词: [axisymmetric geometry](#) [MOF interface reconstruction](#) [multi-material ALE](#) [mixed cell](#)

基金项目:国家自然科学基金(11001026, 11371068)资助项目.

作者	单位	E-mail
曾清红	北京应用物理与计算数学研究所,北京 100094	
孙文俊	北京应用物理与计算数学研究所,北京 100094	sun_wenjun@iapcm.ac.cn

摘要点击次数: 1094

全文下载次数: 508

中文摘要:

推导了轴对称几何下的MOF (Moment of Fluid) 界面重构, 将其与多介质ALE方法相耦合, 形成MOF-MMALE方法, 并应用于多介质大变形流动问题的数值模拟研究。数值算例表明, 耦合MOF界面重构的多介质ALE方法是求解多介质大变形流动问题的有效手段, 并且具有很好的界面精度和分辨率。

英文摘要:

Moment of fluid (MOF) interface reconstruction is extended to axisymmetric geometry, and coupled with multi-material Arbitrary Lagrangian-Eulerian (MMALE) method, called MOF-MMALE method. MOF-MMALE method is applied to multi-material large deformation fluid flow problems. The numerical examples show that MOF-MMALE method is an effective way to simulate problems of multi-material and large deformation flow with high accuracy and good interface resolution in axisymmetric geometry.

[查看全文](#) [查看/发表评论](#) [下载PDF阅读器](#)

参考文献(共14条):

- [1] Anbarlooei H R, Mazaheri K. Moment of fluid interface reconstruction method in Multi-Material Arbitrary Lagrangian Eulerian (MMALE) algorithms[J]. Computer Methods in Applied Mechanics and Engineering, 2009, 198 (47-48):3782-3794.
- [2] Kucharik M, Garimella R V, Schofield S P, et al. A comparative study of interface reconstruction methods for multi-material ALE simulations[J]. Journal of Computational Physics, 2010, 229 (7):2432-2452.
- [3] Galera S, Maire P H, Breil J A. Two-dimensional unstructured cell-centered multi-material ALE scheme using VOF interface reconstruction[J]. Journal of Computational Physics, 2010, 229 (16):5755-5787.
- [4] 冯峰, 王强. 两个质流界面-激波相互作用RKDG方法应用分析[J]. 计算力学学报, 2012, 29 (2):255-261. (FENG Feng, WANG Qiang. The application and analysis of Runge-Kutta discontinuous Galerkin method for shock interaction with two-medium interface flow[J]. Chinese Journal of Computational Mechanics, 2012, 29 (2):255-261. (in Chinese))
- [5] Ahn H T, Shashkov M J. Multi-material interface reconstruction on generalized polyhedral meshes[J]. Journal of Computational Physics, 2007, 226:2096-2132.
- [6] Dyadechko V, Shashkov M J. Reconstruction of multi-material interfaces from moment data[J]. Journal of Computational Physics, 2008, 227 (11):5361-5384.
- [7] Schofield S P, Christon M A, Dyadechko V, et al. Multi-material incompressible flow simulation using the moment-of-fluid method[J]. International Journal for Numerical Methods in Fluids, 2010, 63:931-952.
- [8] Harte J A, Alley W E, Bailey D S, et al. LASNEX-A2-D Physics Code for Modeling ICF[R]. Technical Report UCRL-LR-105821-96-4, Lawrence Livermore National Laboratory, 1996.
- [9] Barlow A J. A compatible finite element multi-material ALE hydrodynamics algorithm[J]. International Journal for Numerical Methods in Fluid, 2008, 56:953-964.
- [10] 曾清红, 孙文俊, 勇珩. 柱坐标系下的MOF界面重构方法研究[J]. 水动力学研究与进展, 2012, 27 (6):704-712. (ZENG Qing-hong, SUN Wen-jun, YONG Heng. MOF interface reconstruction method in cylindrical coordinates[J]. Chinese Journal of Hydrodynamics, 2012, 27 (6):704-712. (in Chinese))
- [11] Caramana E J, Burton D E, Shashkov M J, et al. The construction of compatible hydrodynamics algorithms utilizing conservation of total energy[J]. Journal of Computational Physics, 1998, 146:227-262.
- [12] Loubere R, Shashkov M J. A subcell remapping method on staggered polygonal grids for arbitrary-Lagrangian-Eulerian methods[J]. Journal of Computational Physics, 2005, 209:105-138.
- [13] Goncharov E A, Kolobyanin V Y, Sadchikov V V, et al. Methods for Computation of Thermodynamic States of Mixed Cells in Lagrangian Gas Dynamics. New Models and Hydrocodes for Shock Wave Processes in Condensed Matter, Dijon, France, 2006.
- [14] Haas J F, Sturtevant B. Interaction of weak-shock waves with cylindrical and spherical gas inhomogeneities[J]. Journal of Fluid Mechanics, 1987(181):41-76.

相似文献(共20条):

- [1] 王兵, 许厚谦, 谭俊杰, 石清. 在非结构网格上追踪多介质界面的ALE方法[J]. 空气动力学学报, 2008, 26(1):91-95.

- [2] 贾祖朋.基于MOF界面重构的多物质ALE方法[J].计算物理,2010,27(3).
- [3] 冯其京,刘军,王言金,郝鹏程,姚雯.二维轴对称坐标下基于介质形心和体积的界面重构方法[J].中国科学:物理学 力学 天文学,2014(2):203-211.
- [4] 曾清红,孙文俊,勇珩.柱坐标系下的MOF界面重构方法研究[J].水动力学研究与进展(A辑),2012,27(6):704-712.
- [5] 苏波,唐勇,顾文彬,吴欢.带壳装药在多层介质中爆炸的数值模拟研究[J].爆破,2009,26(1).
- [6] Stéphane Galera, Jérôme Breil, Pierre-Henri Maire. A 2D unstructured multi-material Cell-Centered Arbitrary Lagrangian-Eulerian (CCALE) scheme using MOF interface reconstruction[J].Computers & Fluids,2011,46(1):237-244.
- [7] 王兵,许厚谦,谭俊杰.在动网格上的多介质界面数值处理方法研究[J].力学与实践,2007,29(6):51-55.
- [8] 滕健,袁化成.一种轴对称变几何进气道设计方法[J].航空动力学报,2013,28(1):96-103.
- [9] 王兵,司海青.时刻追踪多介质界面运动的动网格方法[J].计算力学学报,2010,27(2):362-368.
- [10] 刘一华,许金泉,丁皓江.轴对称界面端的扭转问题[J].力学学报,2000,32(3):355-359.
- [11] 刘儒勋,刘晓平,张磊,王志峰.运动界面的追踪和重构方法[J].应用数学和力学,2004,25(3):279-290.
- [12] 陈浩然,苏晓风,杨庆生,郑长良.界面对多相介质平均弹性性能和应力场的影响[J].计算力学学报,1994,11(3).
- [13] 张学莹,赵宁,王春武.多介质流动数值计算中的界面处理方法[J].高压物理学报,2006,20(3):249-256.
- [14] 徐爽,赵宁,王春武,王东红.水/气多介质问题的界面处理方法[J].爆炸与冲击,2015,35(3).
- [15] 张辉,伊卫林,岳连捷,季路成.可变几何轴对称进气道初步设计[J].燃气轮机技术,2008,21(3).
- [16] 石川晴雄 戴瑛.轴对称圆柱界面裂纹的应力奇异性[J].上海力学,1994,15(3):29-39.
- [17] 柏劲松,陈森华,李平,张展翼.多介质可压缩流体动力学界面捕捉方法[J].爆炸与冲击,2004,24(1):37-43.
- [18] 王效贵,王美.考虑尺寸效应的双材料轴对称界面端应力奇异性[J].力学学报,2010,42(3).
- [19] 王利民,刘书海.多介质复合界面裂纹尖端场[J].玻璃钢/复合材料,1996(2):3-5.
- [20] 刘一华.轴对称圆柱界面端的应力奇异性[J].浙江大学学报(自然科学版),1998,32(3):307-314.

您是第4389946位访问者

版权所有:《计算力学学报》编辑部

本系统由北京勤云科技发展有限公司设计