

Accepted Manuscript

An accurate and efficient scheme for acoustic-structure interaction problems based on unstructured mesh

X.Y. Cui, X. Hu, G. Wang, G.Y. Li

PII: S0045-7825(16)31756-X

DOI: <http://dx.doi.org/10.1016/j.cma.2017.01.022>

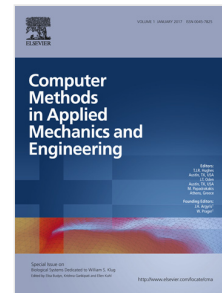
Reference: CMA 11307

To appear in: *Comput. Methods Appl. Mech. Engrg.*

Received date: 7 December 2016

Revised date: 10 January 2017

Accepted date: 18 January 2017



Please cite this article as: X.Y. Cui, X. Hu, G. Wang, G.Y. Li, An accurate and efficient scheme for acoustic-structure interaction problems based on unstructured mesh, *Comput. Methods Appl. Mech. Engrg.* (2017), <http://dx.doi.org/10.1016/j.cma.2017.01.022>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

An accurate and efficient scheme for acoustic-structure interaction problems based on unstructured mesh

X.Y. Cui^{1,2,*}, X. Hu^{1,2}, G. Wang^{1,2}, G.Y. Li^{1,2}

¹State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, Hunan University, Changsha, 410082, PR China

²Collaborative Innovation Center for Intelligent New Energy Vehicle, Shanghai, 200092, PR China

Abstract

This paper focuses on the accurate and efficient numerical implementation of acoustic-structure coupling formulations using the edge-based smoothed finite element method for the flexible shell and the gradient-weighted finite element method for the acoustic fluid field, namely, the ES/GW-FEM. The shell is discretized using the simplest linear triangular elements and the edge-based smoothing domain is then constructed. By introducing an edge local coordinate system, the edge-based smoothing operation is performed on the smoothing domain. As for the acoustic fluid domain, the tetrahedron elements are adopted. A compacted support domain is then constructed and the gradient weighted operation is performed on the support domain. To model the exterior acoustic domain, an artificial boundary is introduced and the Dirichlet-to-Neumann (DtN) boundary condition is imposed. Based on the appropriate compatibility and equilibrium conditions on the interface boundaries, the coupled ES/GW-FEM formulation is finally obtained. Both the interior acoustic-structure coupled problems and exterior acoustic-structure coupled problems are available as the DtN boundary is considered. Numerical examples demonstrate that the coupled ES/GW-FEM achieves much higher accuracy and works more reliable compared with the coupled FEM/FEM in solving practical engineering problems.

Keywords: Acoustic; shell structure; acoustic-structure interaction; numerical methods; the edge-based smoothed finite element method (ES-FEM); the gradient-weighted finite element method (GW-FEM).

* Corresponding author. Tel: 86-731-8821717; Fax: 86-731-8822051

Email address: cuixy@hnu.edu.cn (X.Y. Cui)

Download English Version:

<https://daneshyari.com/en/article/4964141>

Download Persian Version:

<https://daneshyari.com/article/4964141>

[Daneshyari.com](https://daneshyari.com)