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| Altri autori (Persone)  | SouliM<br>BensonD. J <1955-> (David J.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Nota di contenuto       | Cover; Arbitrary Lagrangian-Eulerian and Fluid-Structure Interaction;<br>Title Page; Copyright Page; Table of Contents; Introduction; Chapter 1.<br>Introduction to Arbitrary Lagrangian-Eulerian in Finite Element<br>Methods; 1.1. Introduction; 1.2. Governing equations; 1.3. Operator<br>splitting; 1.4. The Lagrangian step; 1.4.1. Governing equations; 1.4.2.<br>The central difference method; 1.4.3. Element formulation; 1.4.4.<br>Hourglass modes; 1.4.5. Stress rates; 1.4.6. Shock viscosity; 1.4.6.1.<br>von Neumann-Richtmyer; 1.4.6.2. Standard quadratic and linear<br>formulation; 1.4.6.3. Effect on time step size<br>1.4.7. Mixture theories1.4.7.1. Mean strain rate mixture theory;<br>1.4.7.2. Mean stress mixture theory; 1.5. Mesh relaxation; 1.6. The<br>Eulerian step; 1.6.1. Transport in one dimension; 1.6.2.<br>Multidimensional transport by operator Splitting; 1.6.3.<br>Multidimensional transport on unstructured meshes; 1.6.4. Momentum |

transport; 1.6.4.1. Momentum transport using a dual mesh in one dimension; 1.6.4.2. Element-centered transport in one dimension; 1.6.5. Interface reconstruction; 1.6.5.1. Lagrangian methods; 1.6.5.2. Level set methods; 1.6.5.3. Volume of fluid methods; 1.7. Future research directions

1.8. Bibliography

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2.4.4.1. Analytical treatment of the sloshing problem; 2.4.4.2. Sloshing in a rigid tank; 2.4.4.3. Frequency analysis for sloshing; 2.4.4.4. Application to a cylindrical flexible tank subjected to seismic loading; 2.5. Conclusion; 2.6. Acknowledgments; 2.7. Bibliography;

Chapter 3. Implicit Partitioned Coupling in Fluid-Structure Interaction; 3.1. Introduction; 3.2. Computational fluid mechanics; 3.2.1. Governing equations; 3.2.1.1. Incompressible flows; 3.2.1.2. Inviscid flows; 3.2.2. Finite volume discretization; 3.2.2.1. Solution algorithms; 3.3. Computational structural mechanics

3.3.1. Governing equations; 3.3.1.1. Linear elasticity; 3.3.1.2. Plane stress problems; 3.3.1.3. Hyperelasticity; 3.3.2. Finite element methods; 3.4. Fluid-structure interaction algorithms; 3.4.1. ALE formulation; 3.4.2. Mesh dynamics; 3.4.2.1. Algebraic approaches; 3.4.2.2. Elliptic approaches; 3.4.3. Coupling methods; 3.4.3.1. Implicit partitioned coupling; 3.5. Results and applications; 3.5.1. Verification results; 3.5.2. Validation results; 3.5.3. Flow induced by solid deformation; 3.5.4. Interaction of flow and solid deformation; 3.6. Bibliography

Chapter 4. Avoiding Instabilities Caused by Added Mass Effects in Fluid-Structure Interaction Problems

## Sommario/riassunto

This book provides the fundamental basics for solving fluid structure interaction problems, and describes different algorithms and numerical methods used to solve problems where fluid and structure can be weakly or strongly coupled. These approaches are illustrated with examples arising from industrial or academic applications. Each of these approaches has its own performance and limitations. Given the book's comprehensive coverage, engineers, graduate students and researchers involved in the simulation of practical fluid structure interaction problems will find this book extremely useful.