Rapid Structured Volume Grid Smoothing and Adaption Technique

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 24 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.A rapid, structured volume grid smoothing and adaption technique, based on signal processing methods, was developed and applied to the Shuttle Orbiter at hypervelocity flight conditions in support of the Columbia Accident Investigation. Because of the fast pace of the investigation, computational aerothermodynamicists, applying hypersonic viscous flow solving computational fluid dynamic (CFD) codes, refined and enhanced a grid for an undamaged baseline vehicle to assess a variety of damage scenarios. Of the many methods available to modify a structured grid, most are time-consuming and require significant user interaction. By casting the grid data into different coordinate systems, specifically two computational coordinates with arclength as the third coordinate, signal processing methods are used for filtering the data Taubin, CG v29 1995. Using a reverse transformation, the processed data are used to smooth the Cartesian coordinates of the structured grids. By coupling the signal processing method with existing grid operations within the Volume Grid Manipulator tool, problems related to grid smoothing are solved efficiently and with minimal user interaction. Examples of these smoothing operations are illustrated for reductions in grid stretching and volume...

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