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Nota di contenuto	APPLIED COMPUTATIONAL FLUID DYNAMICS TECHNIQUES; CONTENTS; Index; FOREWORD TO THE SECOND EDITION; ACKNOWLEDGEMENTS; 1 INTRODUCTION AND GENERAL CONSIDERATIONS; 1.1 The CFD code; 1.2 Porting research codes to an industrial context; 1.3 Scope of the book; 2 DATA STRUCTURES AND ALGORITHMS; 2.1 Representation of a grid; 2.2 Derived data structures for static data; 2.2.1 Elements surrounding points - linked lists; 2.2.2 Points surrounding points; 2.2.3 Elements surrounding elements; 2.2.4 Edges; 2.2.5 External faces; 2.2.6 Edges of an element; 2.3 Derived data structures for dynamic data 2.3.1 N-trees 2.4 Sorting and searching; 2.4.1 Heap lists; 2.5 Proximity in space; 2.5.1 Bins; 2.5.2 Binary trees; 2.5.3 Quadtrees and octrees; 2.6 Nearest-neighbours and graphs; 2.7 Distance to surface; 3 GRID GENERATION; 3.1 Description of the domain to be gridded; 3.1.1 Analytical functions; 3.1.2 Discrete data; 3.2 Variation of element size and shape; 3.2.1 Internal measures of grid quality; 3.2.2 Analytical

functions; 3.2.3 Boxes; 3.2.4 Point/line/surface sources; 3.2.5 Background grids; 3.2.6 Element size attached to CAD data; 3.2.7 Adaptive background grids
3.2.8 Surface gridding with adaptive background grids
3.3 Element type;
3.4 Automatic grid generation methods; 3.5 Other grid generation methods; 3.6 The advancing front technique; 3.6.1 Checking the intersection of faces; 3.6.2 Data structures to minimize search overheads; 3.6.3 Additional techniques to increase speed; 3.6.4 Additional techniques to enhance reliability; 3.7 Delaunay triangulation; 3.7.1 Circumsphere calculations; 3.7.2 Data structures to minimize search overheads; 3.7.3 Boundary recovery; 3.7.4 Additional techniques to increase speed
3.7.5 Additional techniques to enhance reliability and quality
3.8 Grid improvement; 3.8.1 Removal of bad elements; 3.8.2 Laplacian smoothing; 3.8.3 Grid optimization; 3.8.4 Selective mesh movement; 3.8.5 Diagonal swapping; 3.9 Optimal space-filling tetrahedra; 3.10 Grids with uniform cores; 3.11 Volume-to-surface meshing; 3.12 Navier-Stokes gridding techniques; 3.12.1 Design criteria for RANS gridders; 3.12.2 Smoothing of surface normals; 3.12.3 Point distribution along normals; 3.12.4 Subdivision of prisms into tetrahedra; 3.12.5 Element removal criteria
3.13 Filling space with points/arbitrary objects
3.13.1 The advancing front space-filling algorithm; 3.13.2 Point/object placement stencils; 3.13.3 Boundary consistency checks; 3.13.4 Maximum compaction techniques; 3.13.5 Arbitrary objects; 3.13.6 Deposition patterns; 3.14 Applications; 3.14.1 Space shuttle ascend configuration; 3.14.2 Pilot ejecting from F18; 3.14.3 Circle of Willis; 3.14.4 Generic submarine body; 3.14.5 Ahmed car body; 3.14.6 Truck; 3.14.7 Point cloud for F117; 3.14.8 Hopper filled with beans/ellipsoids; 3.14.9 Cube filled with spheres of different sizes

4 APPROXIMATION THEORY

Sommario/riassunto

Computational fluid dynamics (CFD) is concerned with the efficient numerical solution of the partial differential equations that describe fluid dynamics. CFD techniques are commonly used in the many areas of engineering where fluid behavior is an important factor. Traditional fields of application include aerospace and automotive design, and more recently, bioengineering and consumer and medical electronics. With *Applied Computational Fluid Dynamics Techniques*, 2nd edition, Rainald Lohner introduces the reader to the techniques required to achieve efficient CFD solvers, forming a bridge between