AIRFOIL & ALGGRID: Two Specialized Utilities

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Motivation

- Generation of Some In-House Grid Generation Capability
  - Simplicity
  - Fast Turnaround
  - Easy Usage
  - Hands-On Experience
Outline

- Motivation
- Code Descriptions
- Applications
- Summary
Salient Features of AIRFOIL

- algebraic/elliptic
- AF algorithm
- batch/interactive
- 2-D (C-, H-, O-type grids)
- 3-D via postprocessing (O-H-, C-O-, O-O-type grids)
Salient Features of AIRFOIL – Cont’d

- initial grid
  - interpolation
  - higher-order polynomials (surface grid density, orthogonality near body surfaces)
  - radial stretching

\[ y_i = y_o \frac{\exp(\beta(i - 1))}{\exp(\beta(i_{max} - 1))} \]

- elliptic smoother
  - Poisson equations
  - forcing functions à la Thomas & Middlecoff
Salient Features of ALGGRID

- algebraic
- interactive
- 2-D (C-, H-, O-type grids)
- 3-D via postprocessing (C-O-, O-H-, O-O-type grids)
- initial grid = final grid
  - interpolation
  - radial stretching

\[ y_i = y_0 \frac{\exp(\beta(i - 1))}{\exp(\beta(i_{max} - 1))} \]
C-Type Grid over NACA0012 with AIRFOIL

- Farfield -
C-Type Grid over NACA0012 with AIRFOIL

- Close-Up -

[Diagram of a grid over NACA0012 airfoil with coordinates and labels]
Tangent-Ogive Cylinder Grid

- Detail -

40x145x65
Applications of ALGGRID

- 8ft TPT with choke
- "tinker toy" version of "accelerator"
Concluding Remarks

- Specialized utilities
  - satisfy requirements
  - give a large degree of control over grid generation
  - can constitute a viable alternative to full-fledged grid generation packages (i.e., EAGLE, GD gridding package, etc.)