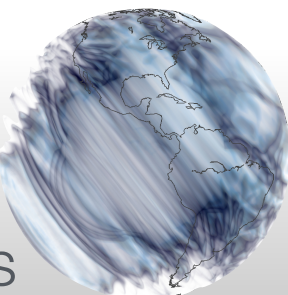# Finite-volume methods

The Computation of Transonic Flow Through Two-Dimensional Gas Turbine Cascades

P. W. McDONALD

Assistant Project Engineer,
Scientific Analysis Section,
Technical & Research Organization,
Pratt & Whitney Aircraft,
East Hartford, Conn.

Steady transonic flow through two-dimensional gas turbine cascades is efficiently predicted using a time-dependent formulation of the equations of motion. An integral representation of the equations has been used in which subsonic and supersonic regions of the flow field receive identical treatment. Mild shock structures are permitted to develop naturally without prior knowledge of their exact strength or position. Although the solutions yield a complete definition of the flow field, the primary aim is to produce airfoil surface pressure distributions for the design of aerodynamically efficient turbine blade contours. In order to demonstrate the accuracy of this method, computed airfoil pressure distributions have been compared to experimental results.
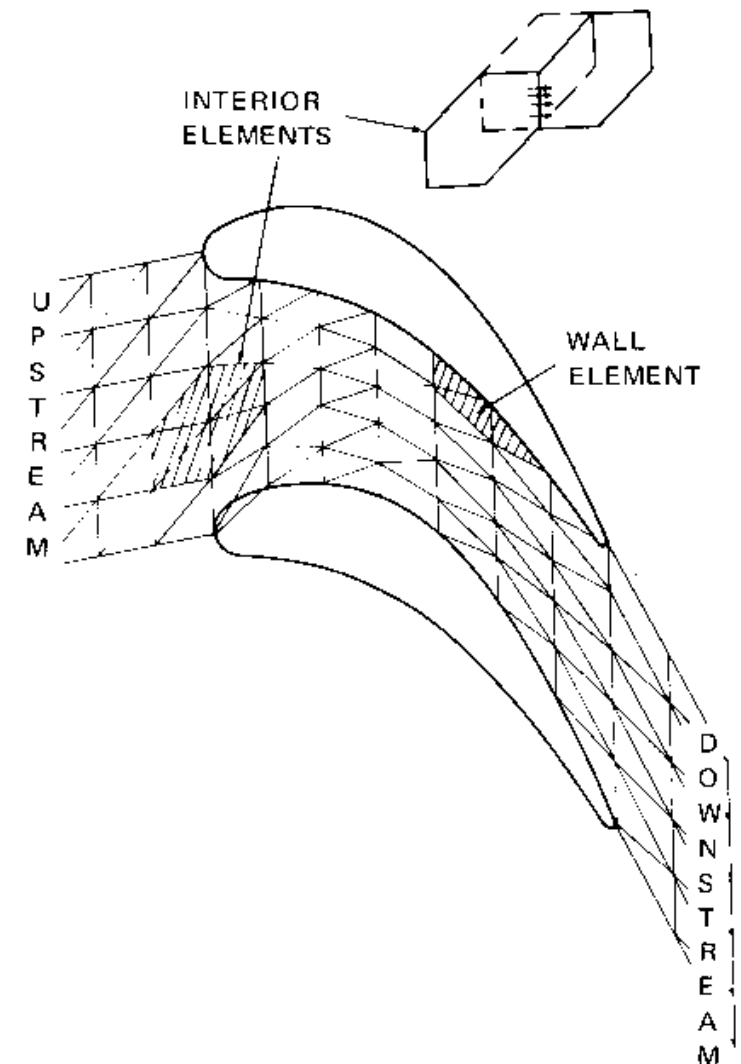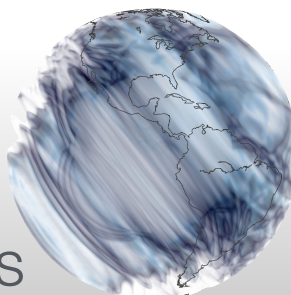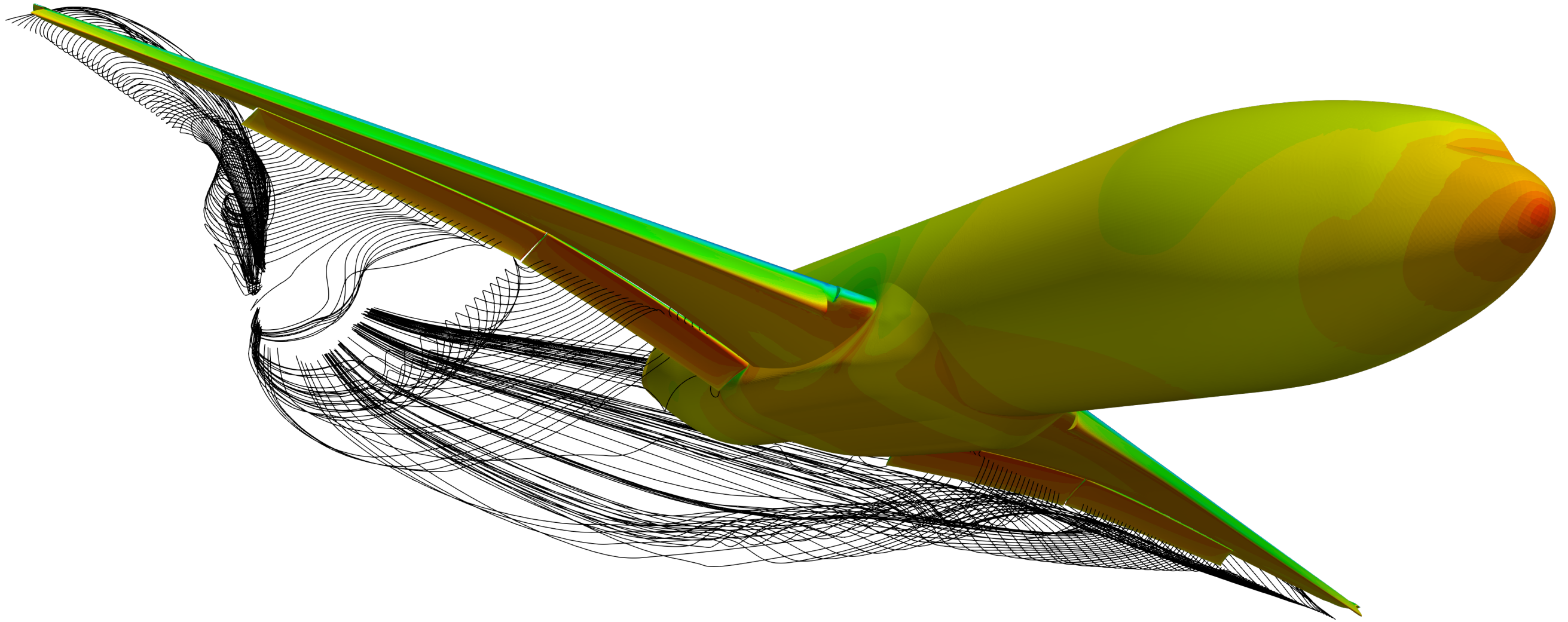
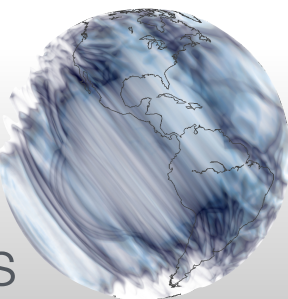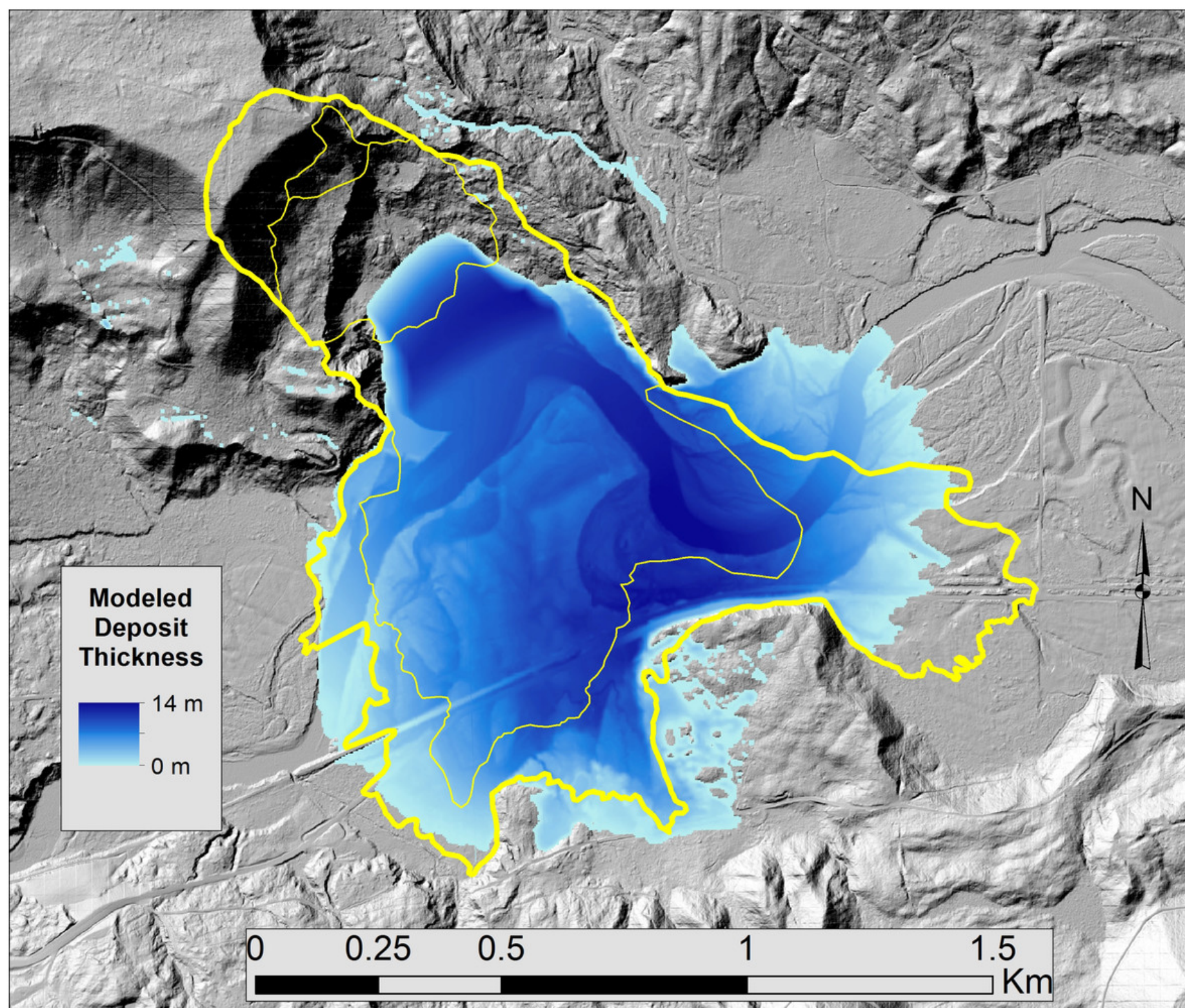Fig. 1 Cascade system with finite area mesh.

[McDonald, 1971]

Computational Geophysics

Computational fluid dynamics
SU2

Modeled Deposit Thickness

14 m

0 m

0   0.25   0.5   1   1.5
Km

N
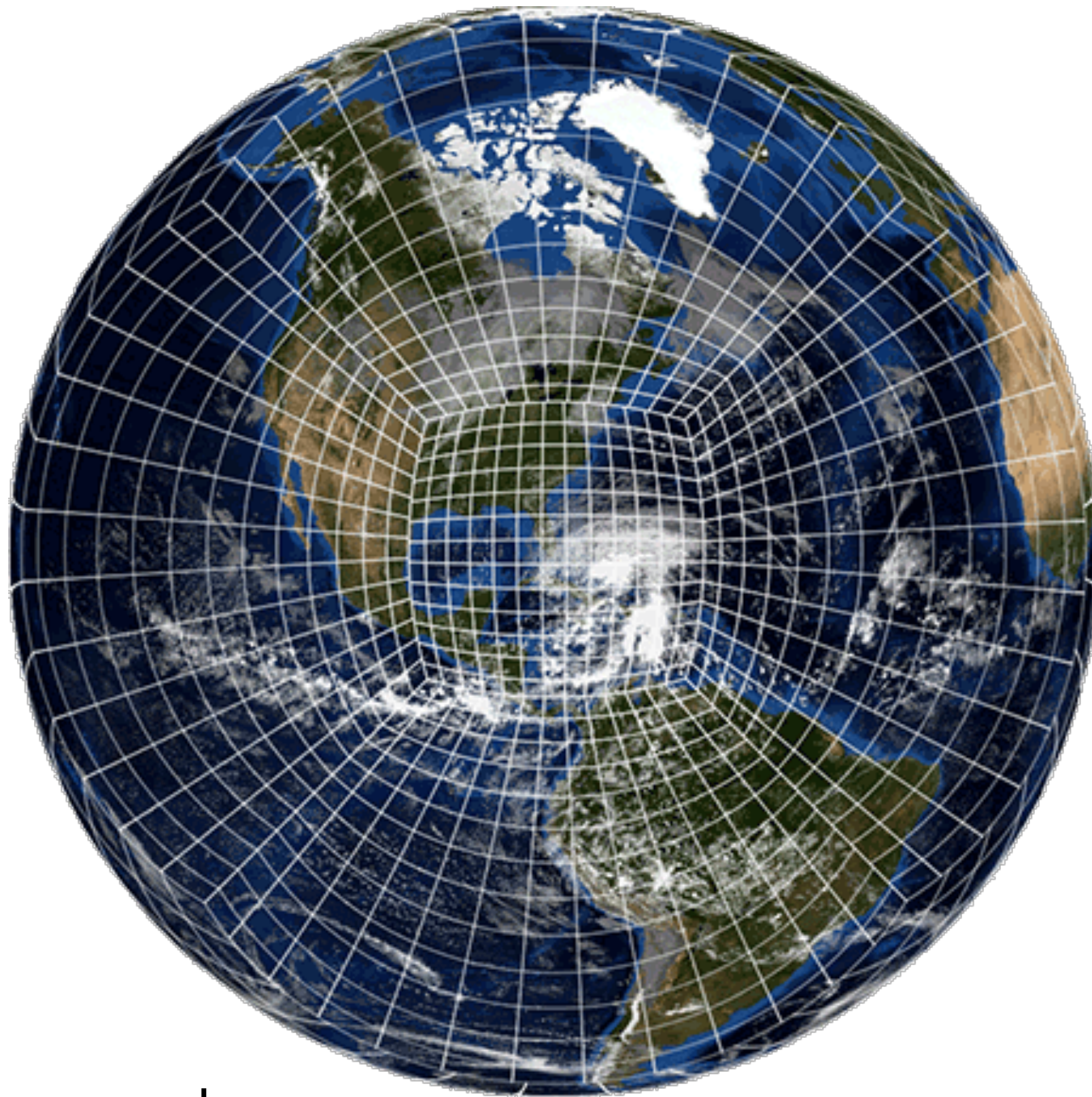
Landslides, tsunamis, shock waves, heat transport ..
CLAWPACK
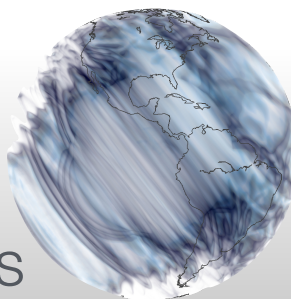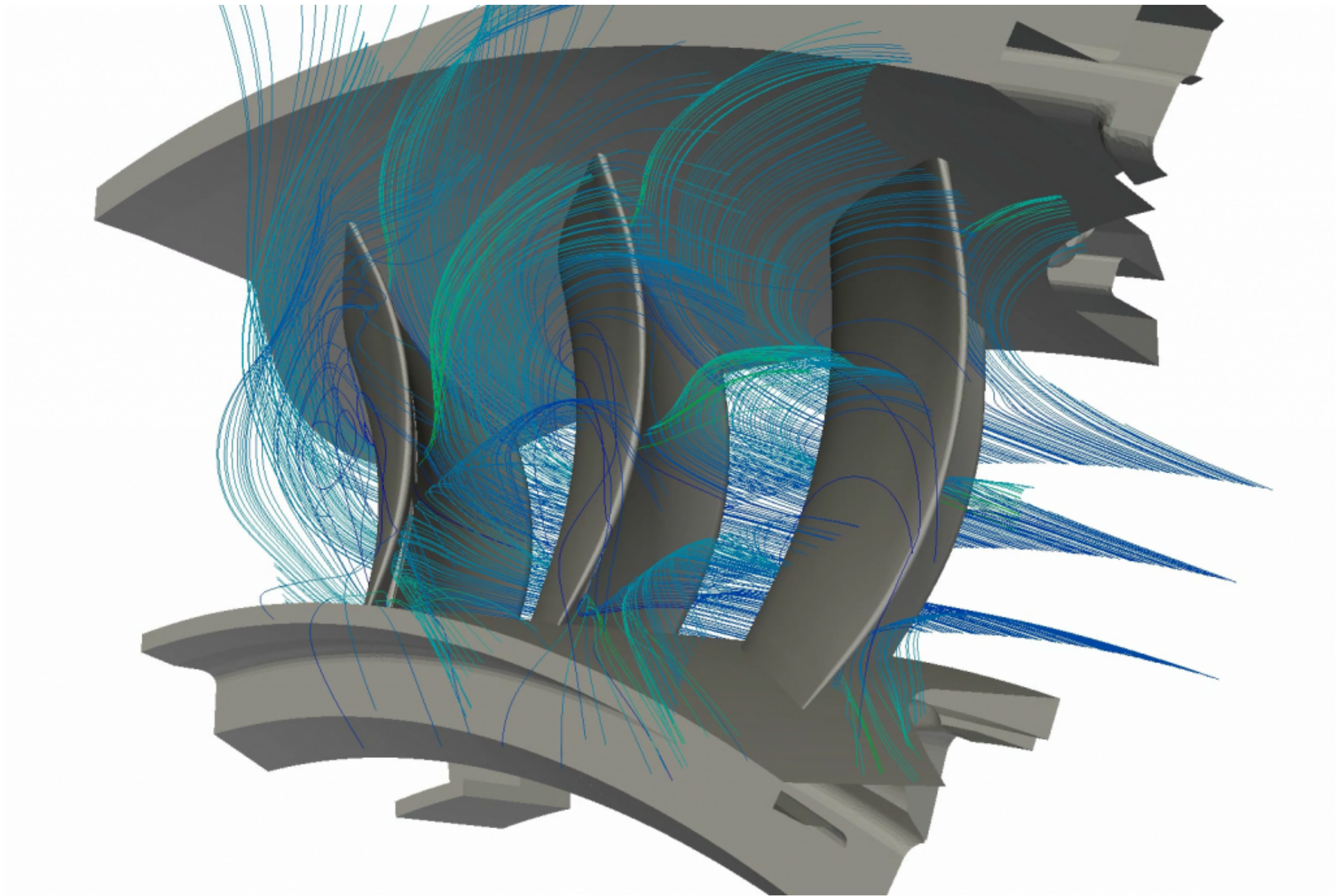
Weather forecasts

NOAA
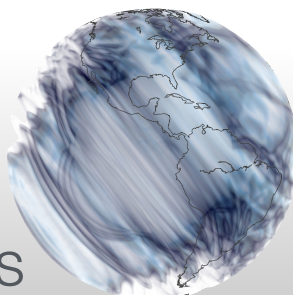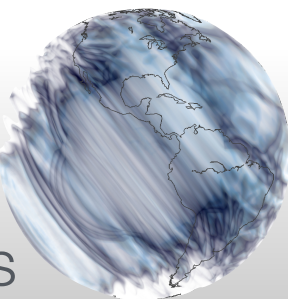
Fluid mechanics
Commercials, ANSYS Fluent,..

Finite-volume software

commercial

ANSYS Fluent
ANSYS CFX
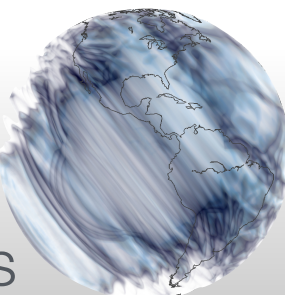**Siemens Simcenter Star-CCM+**

..

open-source

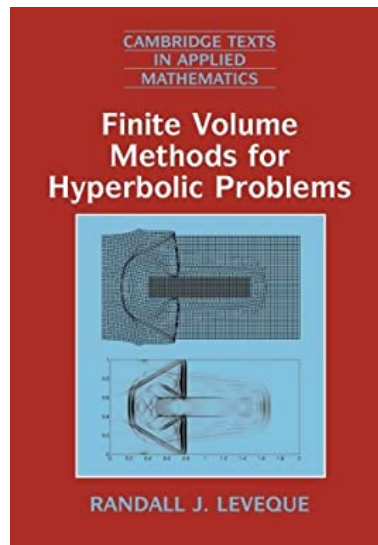**CLAWPACK**
OpenFOAM
SU2
FiPy
Code_Saturne

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Finite-volume literature

books

R. J. LeVeque
Finite Volume Methods for Hyperbolic Problems,
Cambridge University Press, 2004.

online material

https://youtu.be/E9_kyXjtRHc - Aidan Wimshurst, Fluid mechanics 101