STUDY OF AIRPLANE WINGLETS ON LIFT AND DRAG

Jon Barry
Nicole Heacock
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Motivation

• Observation of varying aircraft winglet geometry
• Improve flight performance
• Increase fuel efficiency

Geometry

• Major Boeing 747 dimensions determined
• Boeing 747 Airfoil proprietary, varying cross section
• Modeled in Pro/Engineer with protrusion blends

Geometry Simplifications

• Modeled half aircraft
• Removed curves, airfoil from rear wings
• Removed ailerons, flapperons, rutter (part of original model)
• Solid Engines

Results – Pressure/Velocity

• Similar results for all geometries
• Consistent with Bernoulli’s Principle

10° AOA

Max vorticity: 9.00e+04 Hz
Max vorticity: 8.50e+03 Hz
Max vorticity: 1.08e+05 Hz