3rd AIAA CFD Drag Prediction Workshop

DPW-W1/W2

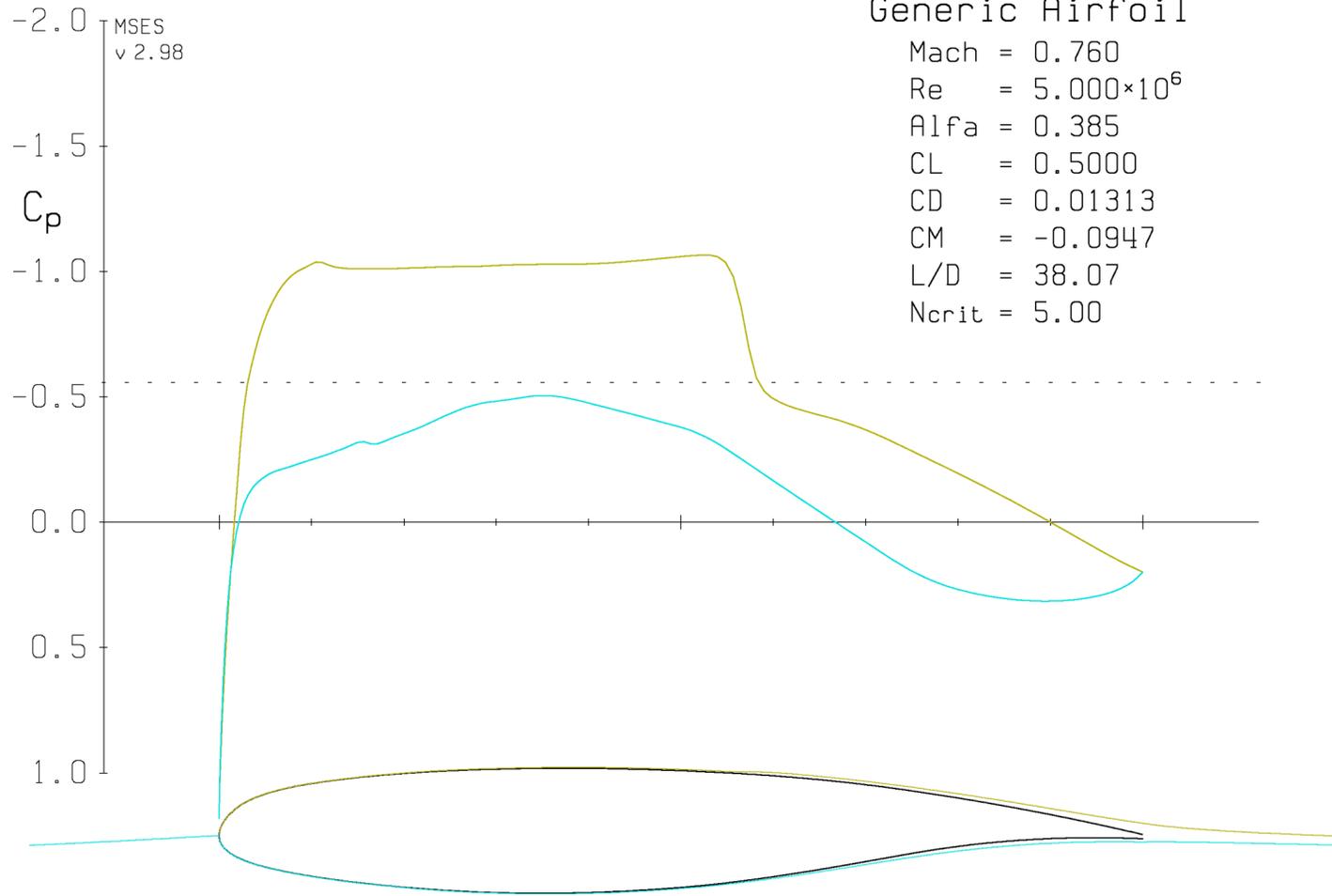# Geometry Review

Tom Zickuhr/Ed Tinoco

DPW Wing Configuration Goals

- Simple Configuration
- No Separation Issues
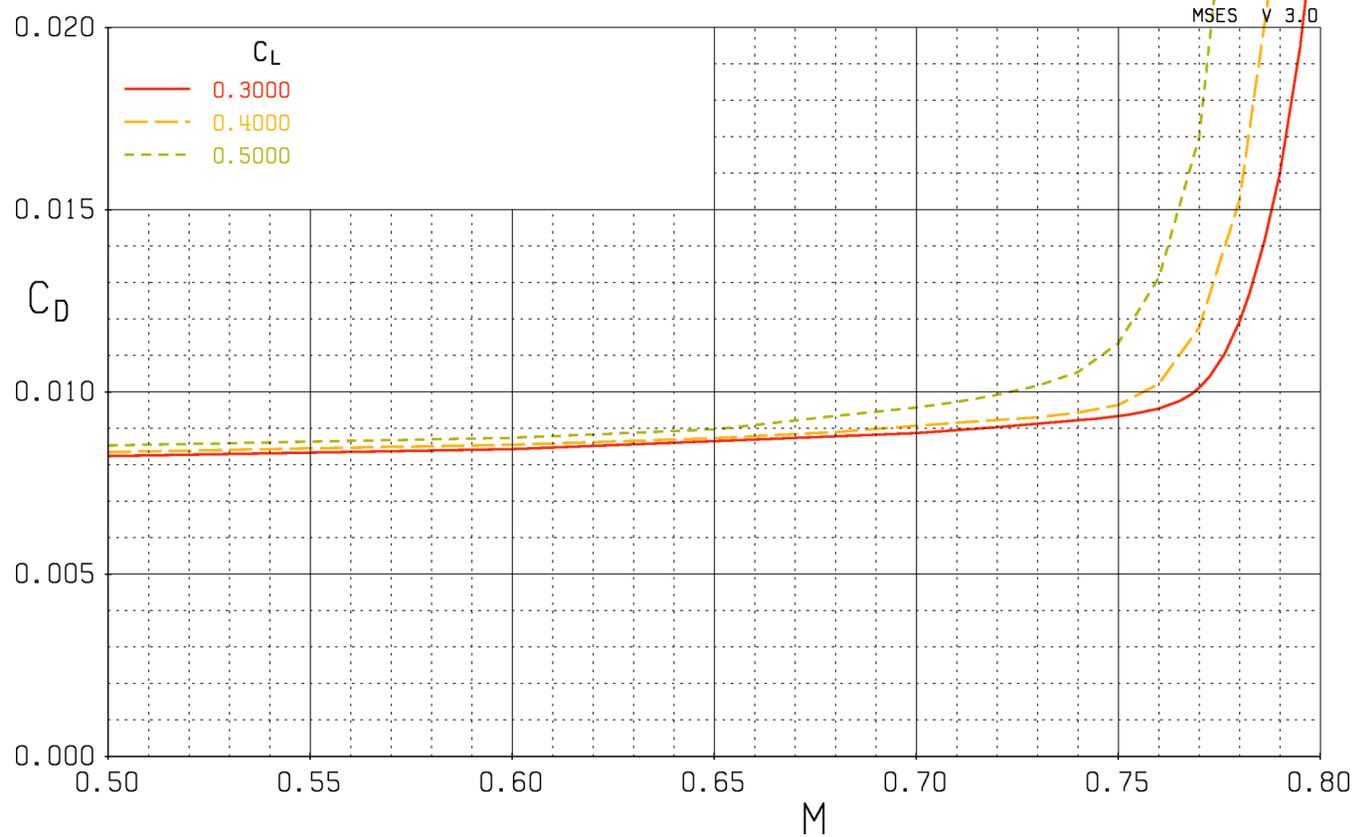- Extended Grid Convergence Study
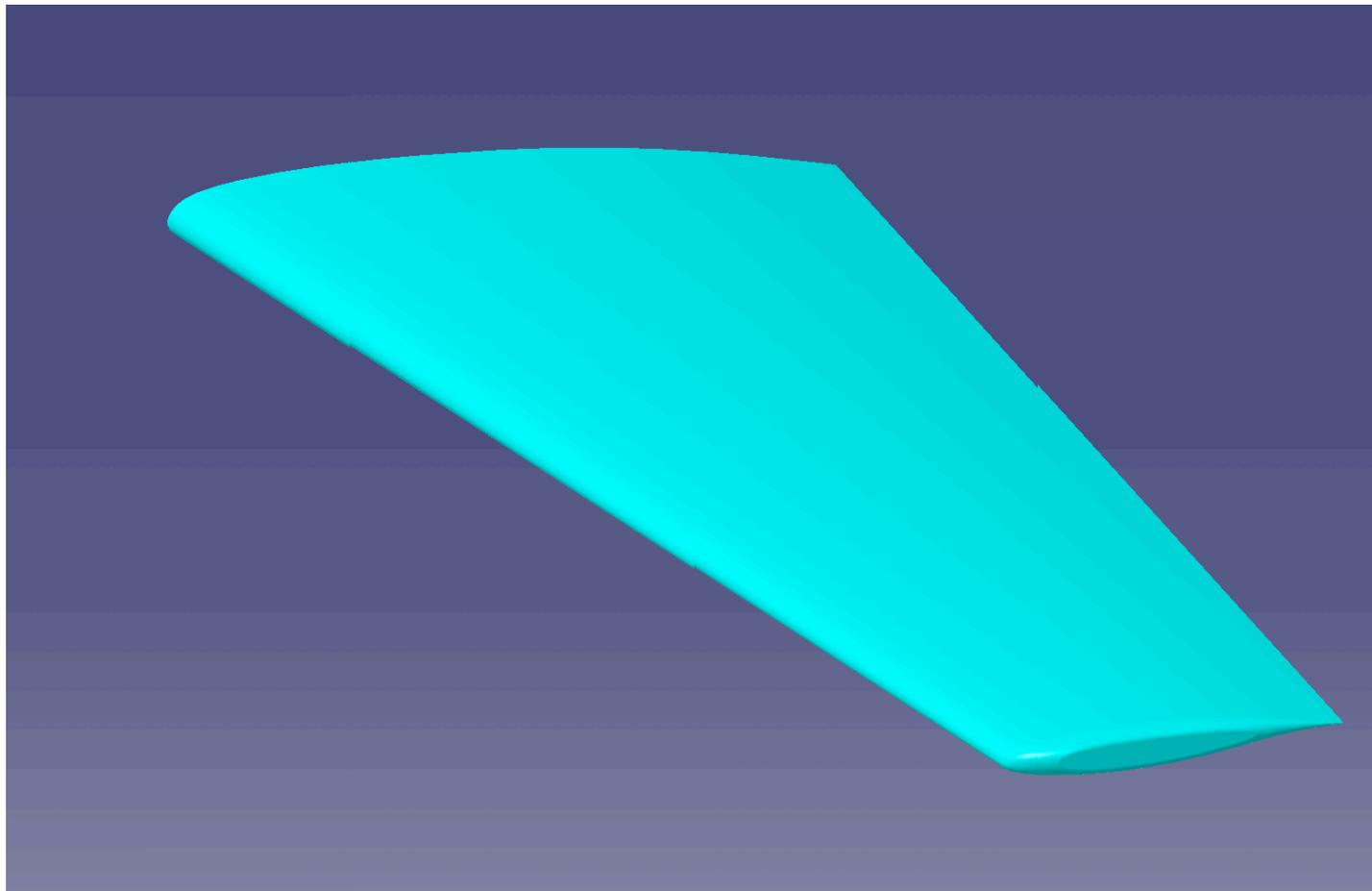
- Potential for Wind Tunnel Model

Airfoil Selection

Airfoil Selection (cont.)

Generic Airfoil   Re = 5.000 ×10^6 CL = 0.300   Ncrit = 5.000
Generic Airfoil   Re = 5.000 ×10^6 CL = 0.400   Ncrit = 5.000
Generic Airfoil   Re = 5.000 ×10^6 CL = 0.500   Ncrit = 5.000

MSES V 3.0

C_L
0.3000
0.4000
0.5000

DPW-W1 – Simple Planform

DPW-W2 Creation

Objective: Create a companion wing to DPW-W1 for drag increment prediction

• Maintain the same planform and thickness

• Use optimization to change camber and twist

   • TRANAIR single-point optimization

      – Sequential Quadratic Programming

         – Linear Constraints

         – Nonlinear Objectives

   • Minimize drag at a specified lift

   • Variables: 5 camber variables + twist + shear @ 7 spanwise locations

DPW-W2 Creation (cont.)
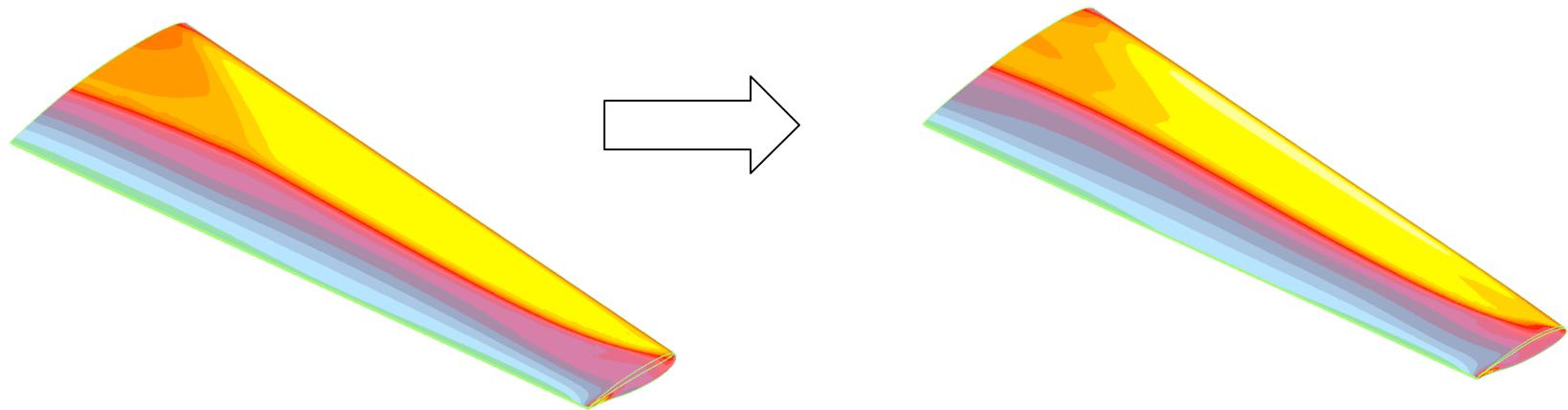
DPW-W1/W2 Shape Comparisons
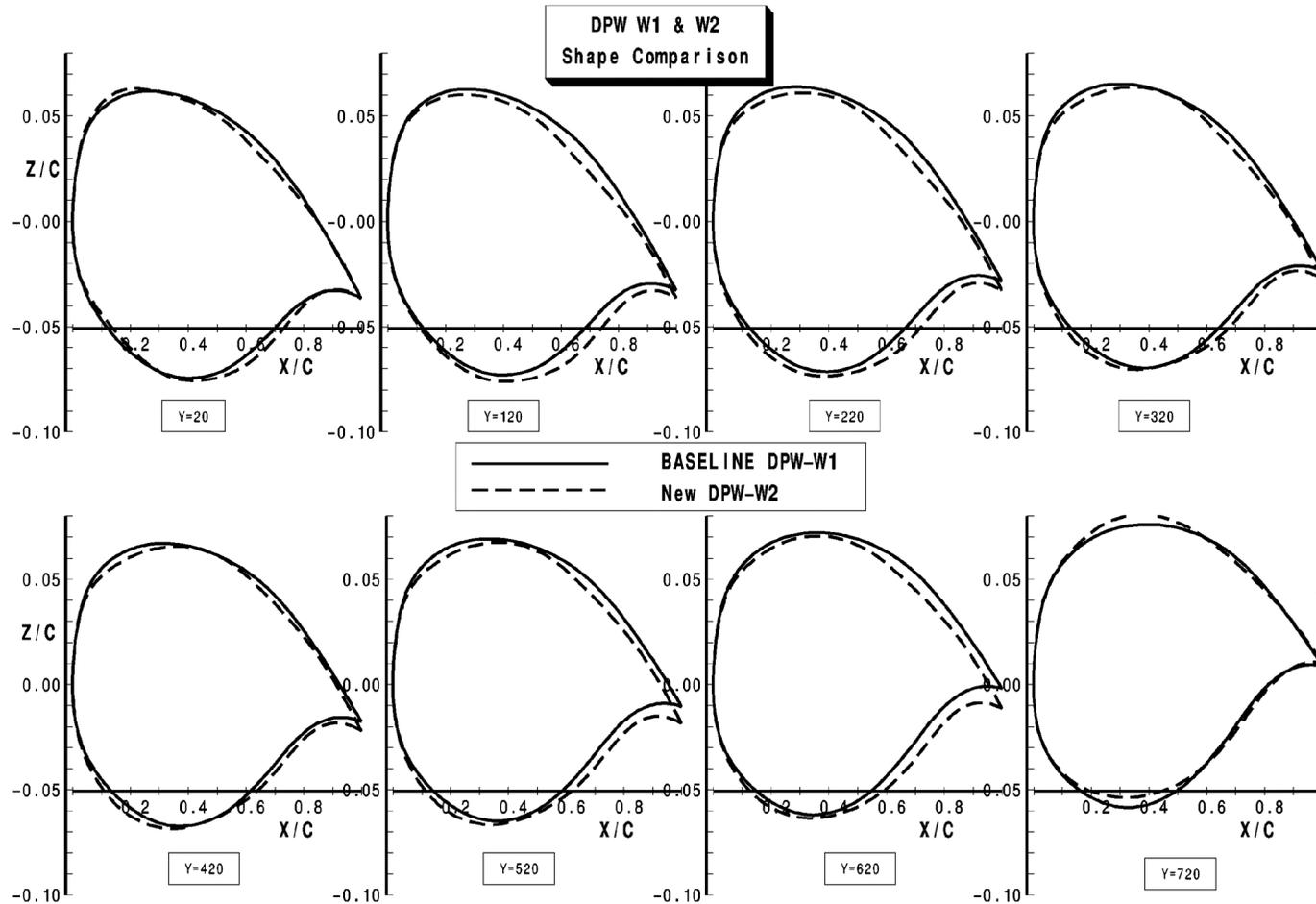
DPW W1/W2 Geometry

Conclusion

Extra Slides

DPW-W1: Tip Detail