

NuMAD

Blade Structural Analysis

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.



Motivation

- Assist utilization of FEA in addition to spreadsheet-based beam models
- Significantly decrease model generation time for 3-D, FE models of wind turbine blades



What is NuMAD?

GUI pre-processor and post-processor for ANSYS[®] finite element analysis software

Tailored to design and analyze wind turbine blade structures

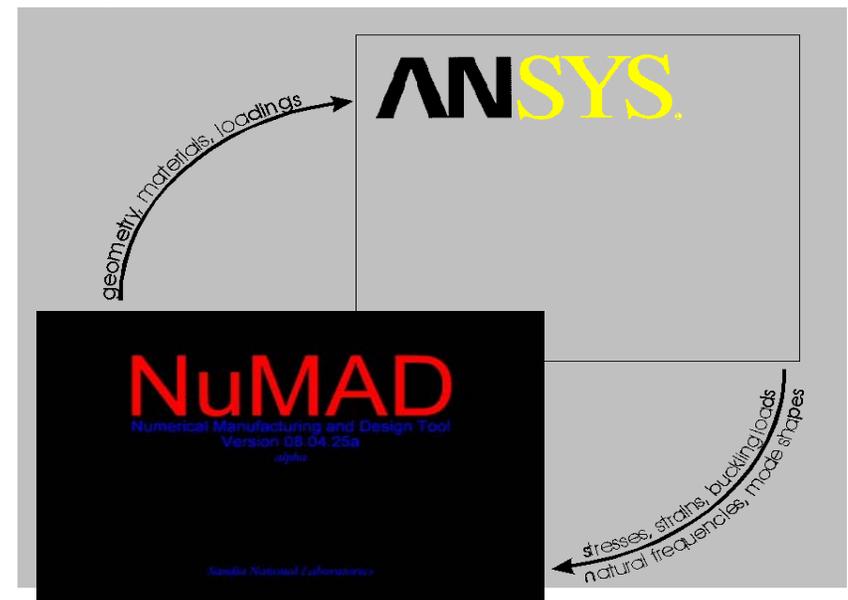
Enables users to quickly and easily create a three-dimensional model and perform structural analyses

General FEA background needed for proper use

Flexibility/expandability

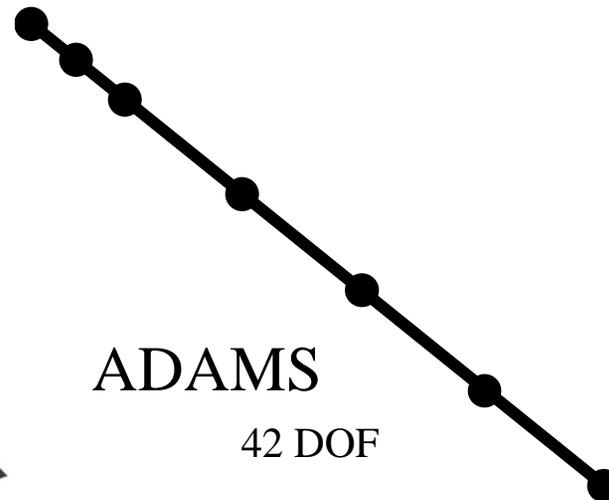
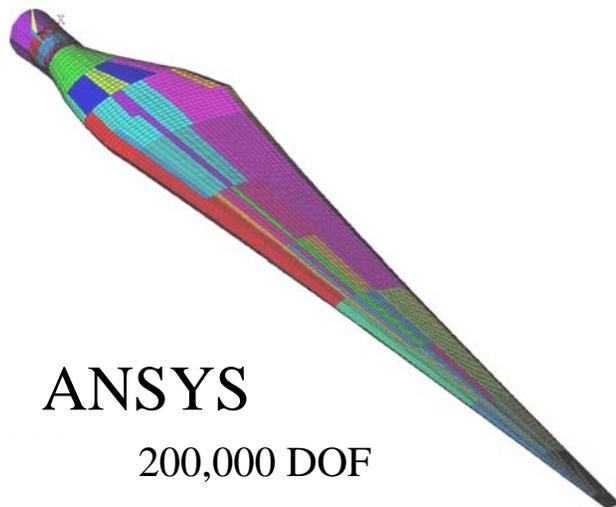
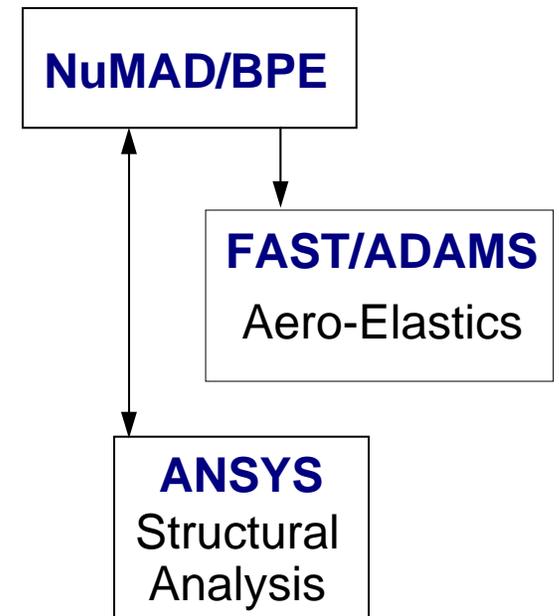
materials database

airfoils database

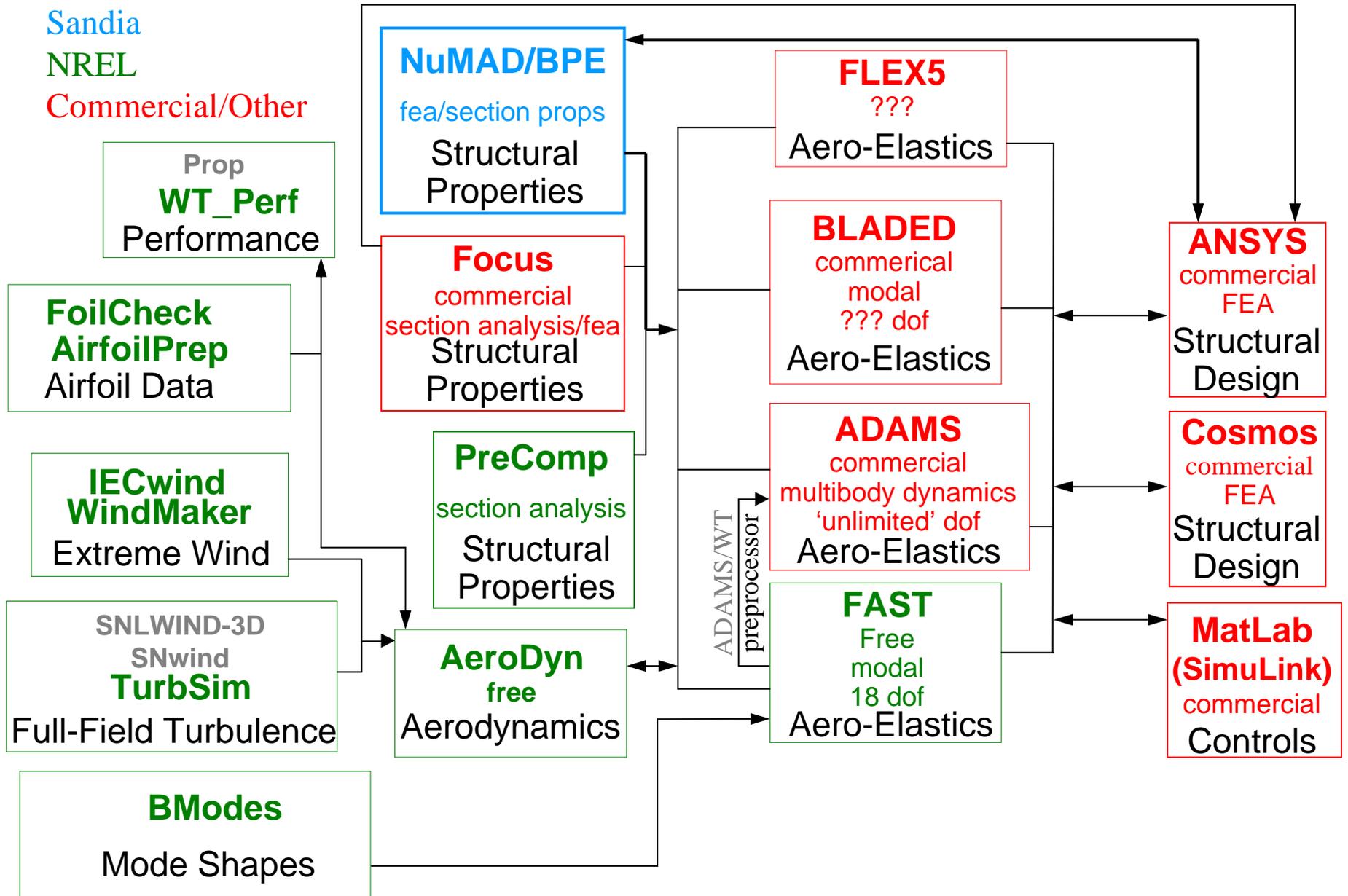


Beam Property Extraction

- Joint effort between GEC and SNL
- Automatically produce 1-D beam element properties needed for an aeroelastic simulation (FAST/ADAMS) from the 3-D structural finite element model (NuMAD/ANSYS)

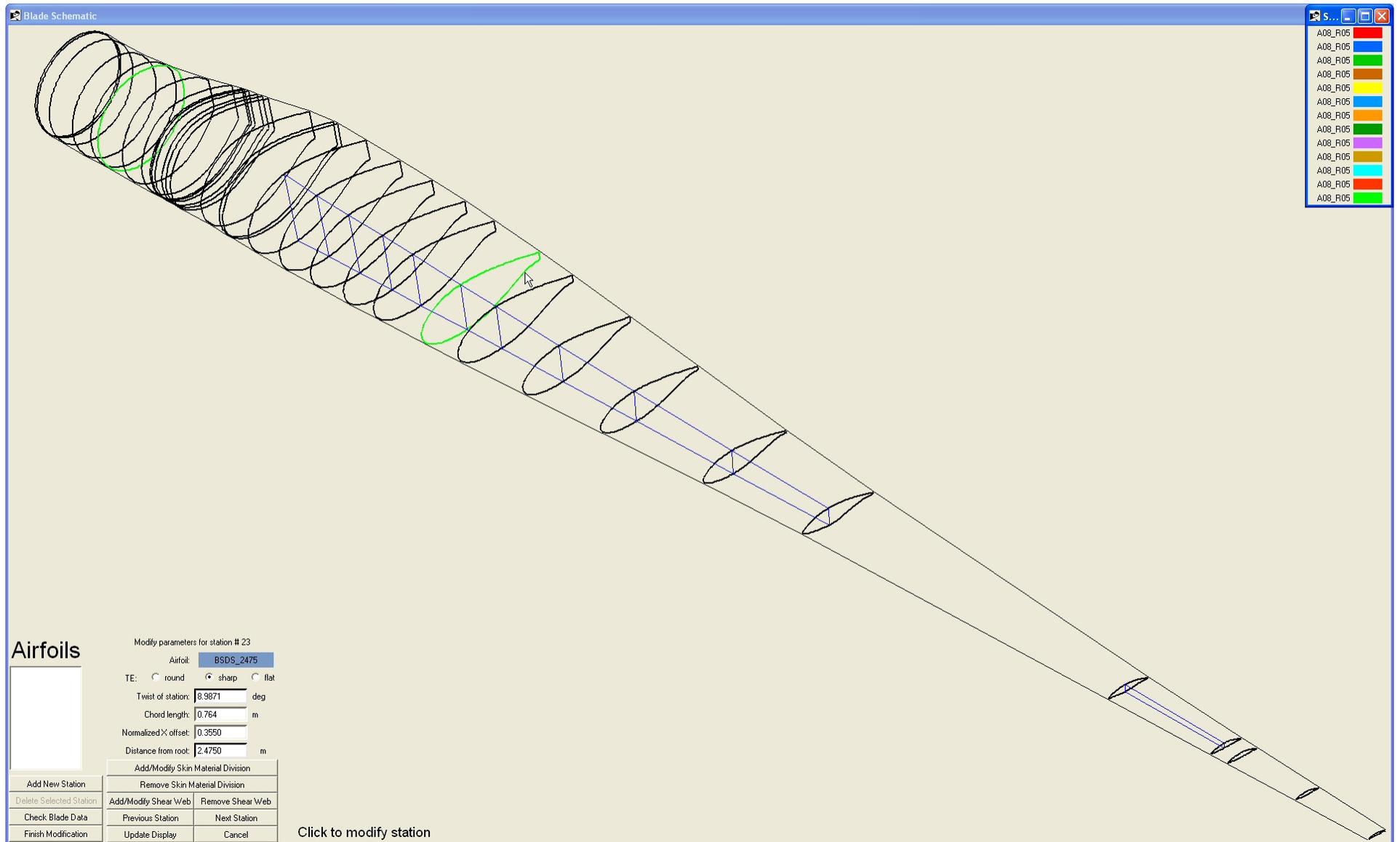


Design Codes (U.S. usage)



Interface (NuMAD2008)

Blade Schematic



A08_R05
A08_R05

Airfoils

Modify parameters for station # 23

Airfoil: BSD5_2475

TE: round sharp flat

Twist of station: 8.9871 deg

Chord length: 0.764 m

Normalized X offset: 0.3550

Distance from root: 2.4750 m

| | | |
|-----------------------------------|-------------------------------|------------------|
| Add/Modify Skin Material Division | | |
| Add New Station | Remove Skin Material Division | |
| Delete Selected Station | Add/Modify Shear Web | Remove Shear Web |
| Check Blade Data | Previous Station | Next Station |
| Finish Modification | Update Display | Cancel |

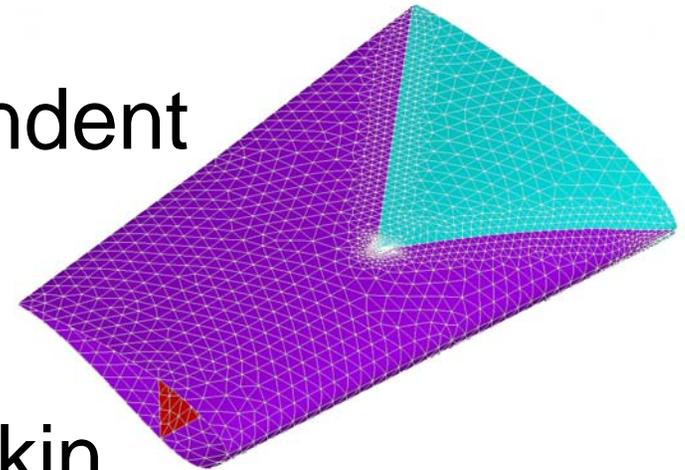
Click to modify station



New Capabilities

NuMAD2008

- Airfoil specification-independent
 - skin material definition
 - shear web placement
- Triangular areas in blade skin
- Free meshing / Meshing control
- Flatback capability
- Multiple element formulations



Obtain Code?
contact me

Thank You