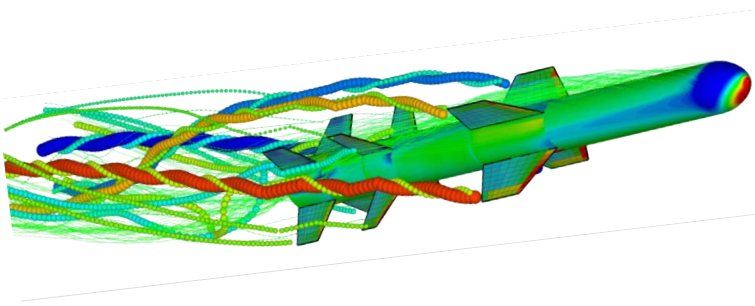

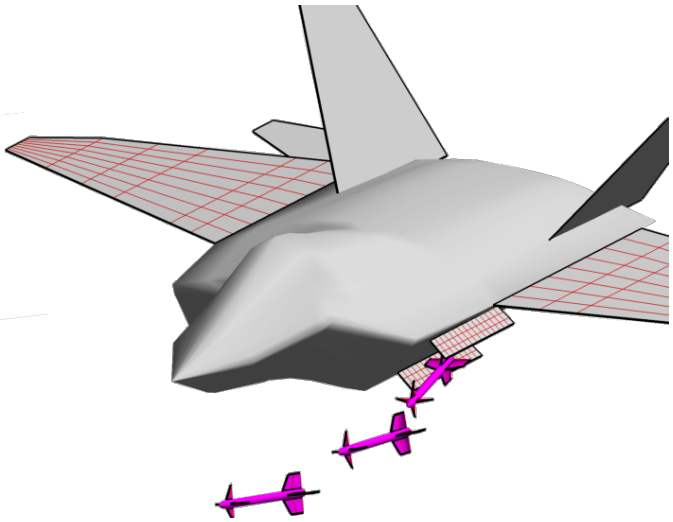

MISL3 • MISDL • STRLNCH

Missile Aerodynamic and Store Separation Prediction

- **Consulting services and software licensing**
- **Analysis/design, trade-offs, optimization**
- **Flight simulation applications**
- **Quick-turnaround . engineering-level**

Contact

Nielsen Engineering & Research, Inc.
900 Lafayette Street, Suite 600
Santa Clara, CA 95050
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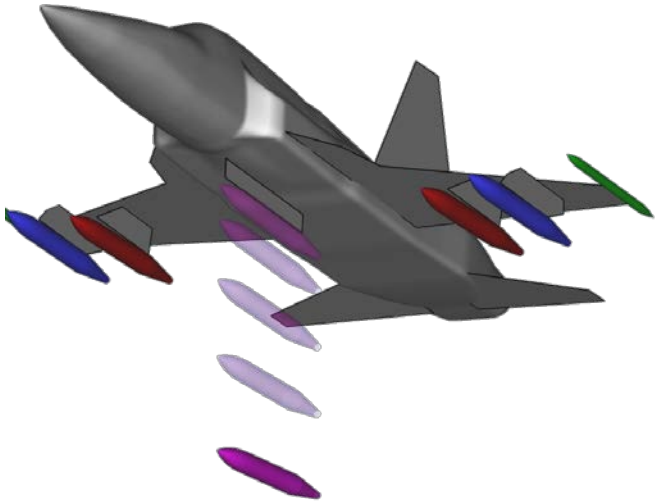


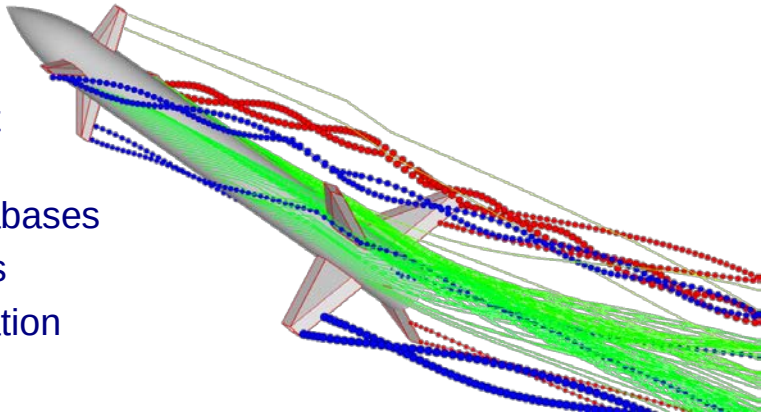
Nielsen Engineering & Research, Inc.

MISL3
Conventional Missile Aerodynamics

NEAR inc
Missile Aerodynamic and Store Separation Specialists

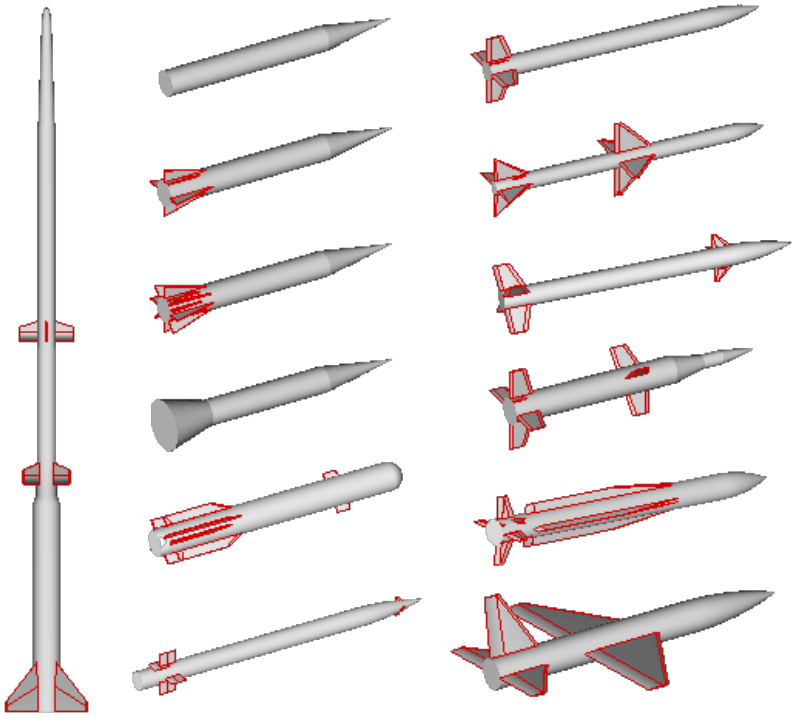
MISL3 aerodynamic prediction applications:

- preliminary design, trade-off studies, optimization
- generation of large databases for flight simulations
- augmenting wind tunnel and CFD databases
- load distributions for structural analysis
- aerodynamics module for store separation and submunition flight simulations



Models important nonlinear phenomena:

Mach number, high angle of attack, arbitrary roll angle, fin deflection, and vortex wake effects including swirling flow



Fast-running Method for Conventional Configurations

- Experimental fin-on-body databases
- High-α body and fin vortex wake models
- Rotational rates & nonuniform flow

Flow Conditions

- Mach numbers up to 5
- Angles of attack up to 90°
- Arbitrary roll angles
- Deflection angles up to 40°

Overall and Component Loads

- 6-DOF forces and moments

  C_A, C_Y, C_N, C_l, C_m, C_n
- Rotational damping derivatives

  C_{lp}, C_{mq}, C_{nr}, C_{Nq}, C_{Yr}
- Fin forces and moments

  C_{AF}, C_{NF}, C_{HM}, C_{BM}

Load Distributions

- Axial distributions for normal and side force

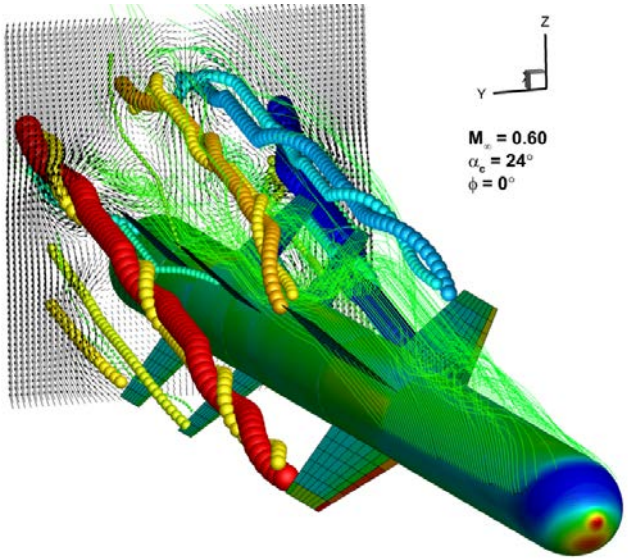
For additional *MISL3* information, comparisons, and references for download see:
http://www.nearinc.com/MISL3

MISDL
Detailed Missile Aerodynamics

NEAR inc
Missile Aerodynamic and Store Separation Specialists

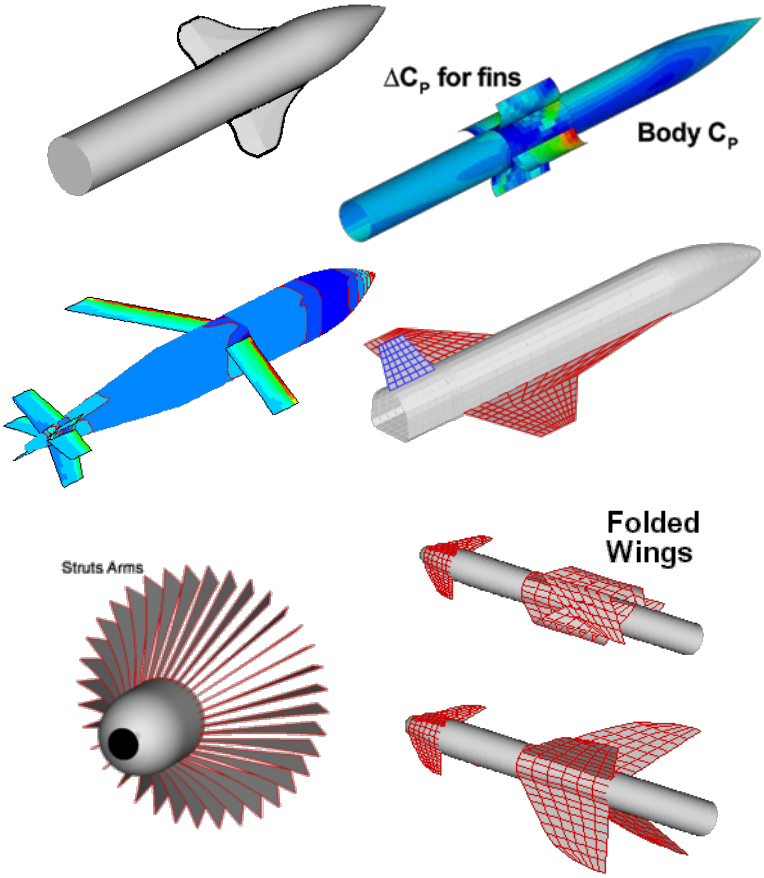
MISDL aerodynamic prediction applications:

- preliminary design, trade-off studies, optimization
- generation of large databases for flight simulations
- augmenting wind tunnel and CFD databases
- detailed load distributions on body/fins for structural analysis
- aerodynamic shape optimization
- aerodynamics module for store separation and submunition flight simulations



Models important nonlinear phenomena:

Mach number, high angle of attack, arbitrary roll angle, fin deflection, and vortex wake effects including swirling flow



For additional *MISDL* information, comparisons, and references for download see:
http://www.nearinc.com/MISDL

Fast-running Method for Conventional and Unconventional Configurations

- Panel-method based
- Circular and noncircular bodies
- Arbitrary planform/fin layout
- High-α body and fin wake vortex models
- Rotational rates & nonuniform flow

Flow Conditions

- Mach numbers up to 4
- Combined angle of attack / fin deflection angles up to 30°
- Arbitrary roll angles

Overall and Component Loads

- 6-DOF forces and moments
  C_A, C_Y, C_N, C_l, C_m, C_n
- Rotational damping derivatives
- Fin forces and moments
  C_{AF}, C_{NF}, C_{HM}, C_{BM}

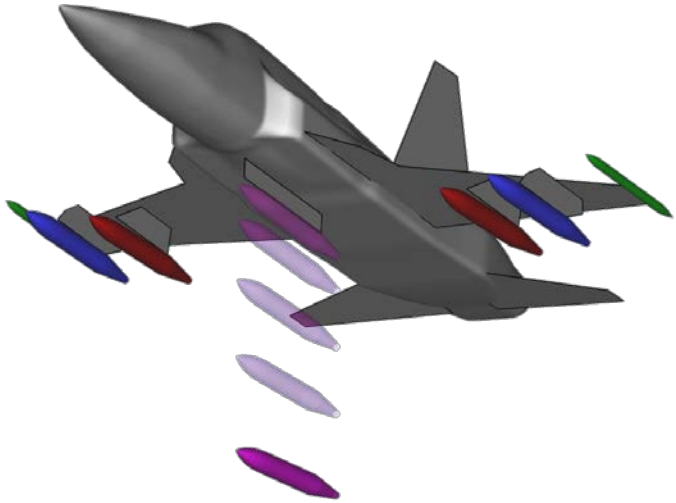
Load Distributions

- Body pressure and axial load distributions, fin load distributions

STRLNCH
Store Separation Prediction

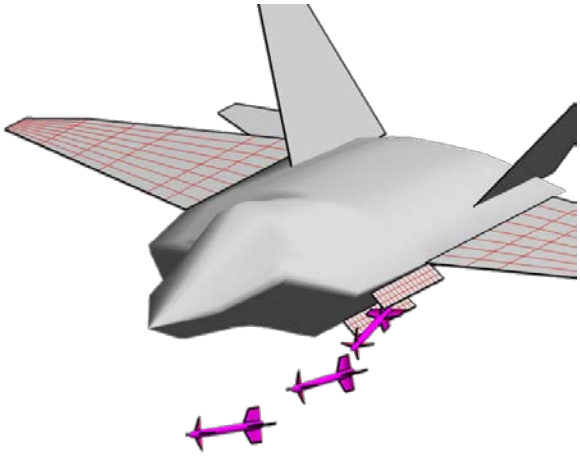
Missile Aerodynamic and
Store Separation Specialists

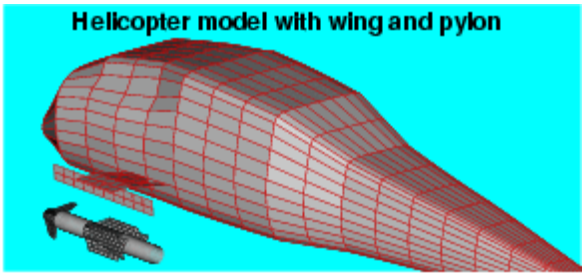
- Comprehensive 6-DOF trajectory simulation of released stores from maneuvering aircraft.
- Preliminary safe launch assessment
- Parent aircraft/store integration analysis
- Reduces need for costly wind tunnel tests



Range of Flow Parameters
Subsonic through supersonic Mach numbers
Parent aircraft angles of attack/sideslip up to 60°
Maneuvering aircraft
Nonzero rotational rates

Quantities Computed
Launched store 6-DOF trajectory characteristics
Overall 6-DOF forces and moments time histories
Fin forces and moments
Detailed carriage load distributions on
store body and fins





Important Parent Aircraft Modeling Features
High angle of attack modeling for fuselage
and wing/pylon(s)

Important Store and Release Modeling Features
See ***MISL3*** and ***MISDL*** aerodynamic modeling
Effects of parent aircraft nonuniform flow
Noncircular store modeling with ***MISDL***
Canard-tail vortical interference
Thrust time histories
Ejection force models
Rail launch option
Hook release and delay modeling
User-specified autopilot
Lanyard model
Wing-deployment model
Umbilical chord model
Time dependent mass properties
Special modeling for wing-tip mounted missiles

For additional ***STRLNCH*** information and references for download see:
http://www.nearinc.com/STRLNCH

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