

## Conjunction Analysis

- Daily space object catalog updates
- Close approach determination
- Probability of collision
- On-orbit operations
- Laser clearinghouse
- Launch window analysis

## Terrain & Cityscape Modeling

- Whole Earth modeling
- Urban models
- Local or server-based terrain
- WGS84 or MSL geodetic data sets
- DTED, DEM, GTOPO30, GEODAS, and MOLA
- Color-coded elevation data

## Constraints for Visibility

- Temporal
- Radio frequency performance
- Physical (body masking, terrain)
- Geometric (range, angle, etc.)
- Lighting
- Field of view
- Radar
- Weather
- Interference and jamming
- User defined

## Communication Link Analysis

- Single and multi-hop links
- Analytical and user-defined power spectral density and filters
- Adjacent channel interference
- Light speed signal propagation delay modeling
- Terrestrial propagation
- Interference and jamming
- Laser communication models
- Collection of built-in transmitter and receiver models
- User-defined models for transmitters, receivers, antenna, and phased array

## Rendezvous & Proximity Operations

- Launch-to-rendezvous, proximity, and docking maneuvers
- Full force model
- Closed-loop control simulation
- Rendezvous trajectory design
- Maneuver planning
- Spacecraft design and engine modeling
- Sensor design
- Communications design
- Extensible architecture for control law R&D

## Aircraft & UAV Modeling

- Performance-driven 6DOF trajectory modeling
- Take-off, VTOL, holding procedures, and landing maneuvers
- Communications, navigation, and sensor system modeling
- Airspace conflict analysis

## Imagery & Map Data

- Whole Earth imagery
- GIS data and ESRI map documents
- Local and server-based high-resolution imagery
- CADRG, JPEG 2000, CIB, GeoTIFF, and NITF
- Navigation charts

## Ground-Facility Modeling

- City and facility database
- Azimuth and elevation masking

## Real-Time Data Feeds

- Simultaneous display and animation of thousands of data tracks
- Data standards ingestion
- Live data publication into enterprise and service-oriented architectures
- Track management, archiving, and playback
- Metadata filtering, enterprise synchronization, and alerting
- MIL-STD-2525b symbology

## Sensor Modeling

- Collection opportunity optimization and scheduling
- Conic, rectangular, SAR, and custom field of view
- Fixed, target pointing, and scanning
- Constrained field-of-view visualization
- Inherit 6DOF platform motion
- Boresight view
- Body-obscuration modeling

## Weather & Atmospheric Effects

- ITU and Crane models for rain propagation and atmospheric absorption loss
- Tropospheric scintillation
- Cloud and fog models
- Real-time weather impact on communications, radar, and visibility

## Underwater Modeling

- Underwater terrain analysis and visualization
- Extensible plug-in architecture for acoustic modeling
- Track data integration for anti-submarine warfare analysis
- 3-D visualization of bathymetric data

## Spacecraft Design & Operation

- Solar array power analysis
- Spacecraft exposure to ionizing particles and thermal radiation
- Mission plan to real-time data comparison
- Attitude modeling

## Maneuver Modeling

- Impulsive and finite burns
- Control parameter targeting
- Maneuver scheduling
- Attitude modeling
- Constant thrust, polynomial, ion, and plug-in engine models
- Station keeping
- Maneuver reconstruction
- Parameter targeting and optimization

## Celestial Environment

- Star database
- JPL planetary ephemerides

## Antenna Modeling

- 30+ antenna models including parabolic, Gaussian, helix, dipole, ITU, and aperture
- User-defined antenna models including phased arrays
- Multi-beam antenna modeling and aggregate gain patterns
- Body masking
- Beam forming and adaptive nulling phased-array modeling
- Polarization and modulation effects
- Impact of refraction on signal propagation and antenna gain

## Radar Analysis

- Monostatic and bistatic models
- Radar placement optimization
- SAR modeling
- Jamming effects on radar performance
- Signal spectrum analysis and filtering
- Phased array and custom plug-ins

## System Performance Analysis

- Instantaneous or cumulative coverage for platforms, routes, or regions
- Whole Earth or custom region
- Dilution of precision (DOP)
- User-selected figure of merit: N asset, time average, gap, SNR, and BER
- Multiple algorithms for task and resource allocation
- Multi-satellite, multi-target, and network chain analysis
- Reporting, graphing, and dynamic data displays
- Resource scheduling

## Orbit Trajectory Modeling

- Two-body, J2, J4, and SGP4 analytical propagators
- High-precision orbit propagator (HPOP) using numerical integration
- User-defined atmospheric drag, solar radiation pressure, and gravity models
- User-defined coordinate systems
- JPL/SPICE support
- Daily space object catalog updates
- Mission control sequences for trajectory design
- Parameter targeting and optimization

## Global Navigation Satellite Systems

- Satellite almanac, raw measurement, ephemeris file, and NANU processing
- Historical, real-time, and predicted navigation accuracies
- Real-time constellation performance
- Clock bias and steering
- Calculate URE, UEE, UERE, and composite signed errors
- High-fidelity receiver modeling
- Impacts of jamming and interference
- Complete orbit and clock estimation

## Missile Modeling

- ICBM and short-range theater missile design
- Powered flight simulation and high-fidelity propagation
- Staging
- Attitude maneuver
- Intercept analysis
- Multiple RVs
- Radar cross-sections
- Defended-area analysis
- Custom missile models

## Orbit Determination

- Geodetic quality force and measurement modeling
- Ground-based, space-based, GPS, RF, optical, and laser tracking
- Optimal filter providing realistic covariance
- Fixed interval smoother
- Maneuver calibration
- Maneuver detection and estimation
- Geolocation using TDOA and FDOA
- Extensible tracking data format support
- Tracking data simulator
- Tracking system design
- Orbit accuracy prediction based on tracking schedule

## Lunar & Interplanetary Analysis

- Impulsive and finite burn modeling
- Lagrange point mission design and visualization
- User-definable central bodies and force models
- Transfer, orbit insertion, and swing-by design
- Target ephemerides
- IAU attitude models
- Dynamic Earth, Lunar, and Martian sensor coverage using 3-D terrain elevation data
- B-plane targeting and visualization