

CAST-100 Navigation Simulator - NAVSIM

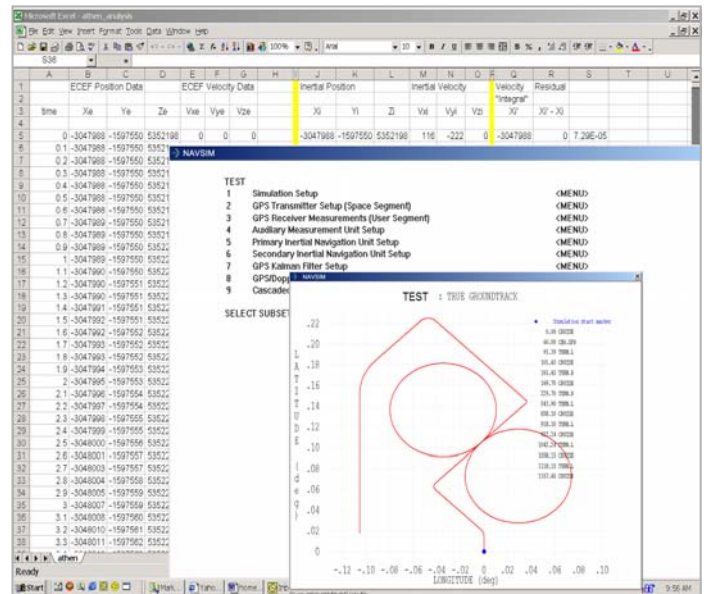
Navigation System Performance Evaluator

NAVSIM is an analytical tool used as an aid to system configuration selection, system tuning, sensor trade-off studies, scenario preparation, and performance analysis. The core of NAVSIM is a comprehensive Monte Carlo simulation of a Global Positioning System (GPS) and Inertial Measurement Unit (IMU) integrated navigation system.

NAVSIM enables evaluation of total navigation system performance under simulated conditions using robust modeling for vehicle motion, satellite constellation, GPS receivers, inertial platforms, and other navigation sensors such as Doppler and types of altimeters.

Software Components

- *User Motion Generator* - Produces vehicle motion scenarios for aircraft, surface/subsurface vessels, and land vehicles.
- *Host Vehicle Sensor Equipment* - Configured to support a set of independent measurement devices such as pseudorange and pseudorange receiver, host vehicle clock, IMU, INS, AHRS, differential GPS receiver, multi-beam Doppler radar, barometric and radar altimeter, and DME.
- *Transmitter Motion Generator* - Models 24 satellites and up to 10 pseudolites.
- *Radio Signal Propagation Media Effects* - Implements troposphere and ionosphere error models.
- *Cascaded Multi-State Kalman Filter* - Operates in either GPS-only or in IMU-aided configurations.
- *Multi-State Kalman Filter* - Integrates GPS navigation data from a Kalman filter with a second INS.
- *GFE Phase III Inertially Integrated Kalman Filter* - Integrates GPS measurements with a gimballed INS via a 12 state-aided configuration for GPS Phase III.
- *Post-Simulation Analysis* - Generates many printable navigation reports and also produces a variety of user selected plots.
- *Interactive Initialization Editor* - Provides realistic, default values for all simulation parameters allowing the user to quickly generate a scenario and then customize the inputs as desired.



The NAVSIM System Interface

System Features

- Set vehicle type and simulated dynamics, sensor variables, INS error parameters, GPS receiver configuration, and satellite constellation parameters.
- Interactively tailor a vehicle motion profile and selectively control satellite signal reception and degradation.
- Perform actual Monte Carlo simulation of GPS/INS system based on parameters you provide including data rates, navigation profile, Kalman filter processing, and hardware configuration.
- Configure the GPS receiver as a navigation subsystem for providing position and velocity data.
- Control a complete set of avionic sensors in addition to GPS measurements.
- Compute navigation error statistics, print reports of analysis, and view plots of selected error statistics.
- System is installed on Pentium®-based Windows PC.
- Hardware-in-the-loop option available.

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