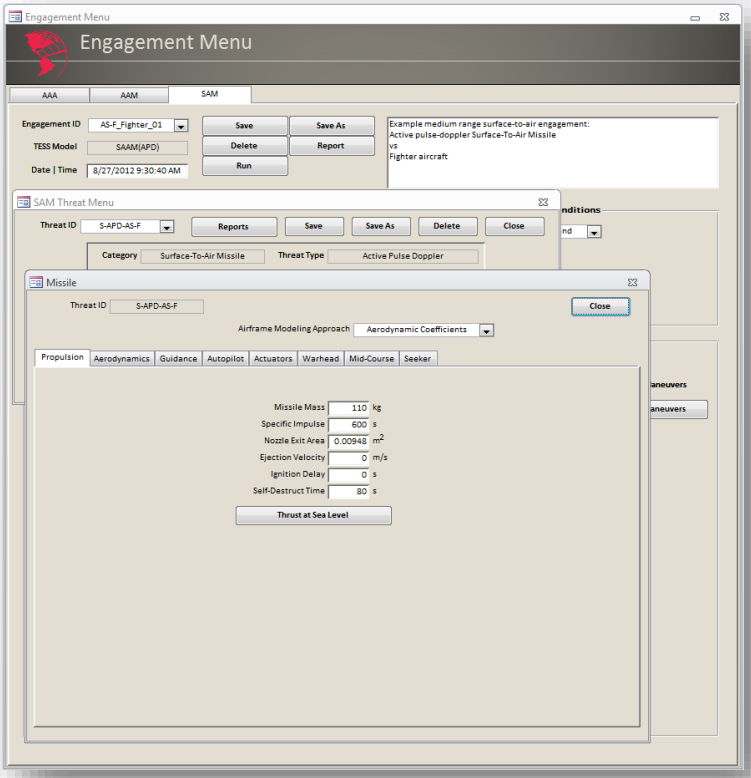
TACTICAL TECHNOLOGIES
a LEONARDO company

Integrated Land Active Protection System ILAPS

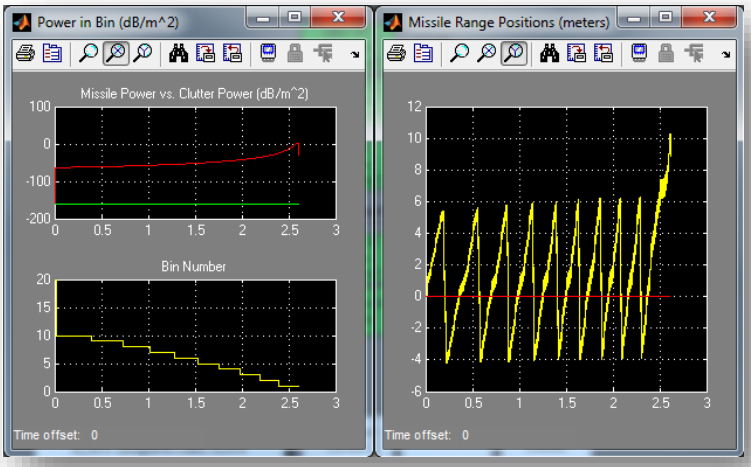
TACTICAL ENGAGEMENT SIMULATION SOFTWARE – TESS™
Modeling and simulation based tools for electronic attack and protection development

Overview

ILAPS is a member of the Tactical Engagement Simulation Software (TESS) family of physics-based simulation products. ILAPS models closed-loop engagements and interactions between a land target platform and a semi-automatic command-to-line-of-sight (SACLOS) anti-tank guided missile (ATGM) or an unguided rocket propelled grenade (RPG). The maneuvering target can use soft-kill assets (obscurant smoke or an IR "hot spot" jammer), and/or hard-kill asset (trainable launcher with counter munition rounds) to defend itself from the incoming threat. Staring radar and infrared arrays on the tank detect and track the incoming threat and the fire-control computer assesses the scenario and reacts as appropriate with countermeasures. The threat has both a radar cross section and an IR signature. ILAPS uses an imaging tracker to emulate the operator and a missile beacon tracker to follow the missile and steer it towards the target. In RPG engagements the guidance is disabled and the RPG must be fired with the appropriate elevation and lead angle. The IR signature of the tank is specified in detail with the TESS IR Profiler included in the product. Two staring array radar systems (one pulse Doppler and one FMCW), two fire-control computers and two launchers are included so that the soft-kill and hard-kill countermeasure systems can be developed and tested independently. TESS products simulate all phases of an engagement from missile launch, target acquisition and tracking, countermeasure deployment and end-game intercept. Measures of effectiveness such as miss distance, probability of kill and probability of survival are computed at the end of each simulation run. Like other TESS products, ILAPS is built in the MATLAB/Simulink environment and with its available source code, users can review, inspect and modify any of the underlying models and algorithms. A front-end database allows the user to define and store data libraries of Targets, Countermeasures and Threats. A programmable batch runner is included for executing batch runs (Monte Carlo) of simulated tactical engagements.



TESS Master Interface



Typical TESS Output Scopes

Technical Description

Target Modeling

- Configure the target as any type of land platform.
- Set the target's initial position, orientation and velocity.
- Specify the target's evasive maneuvers using acceleration commands and timings.
- Import existing RCS data or generate lookup tables from 3D objects using the built-in RCS prediction tool.
- Customize the IR signatures by characterizing individual surface elements' temperatures and spectral emissivities or by importing texture maps.

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Soft-Kill Countermeasure Modeling

- Select obscurant smoke rounds or an IR "hotspot" jammer.
- Customize the radar, fire control and launcher systems.
- Define the smoke grenade deployment timing sequence, smoke cloud bloom/decay characteristics, obscurant spectral mass extinction and radiance.
- Characterize the IR jammer by its radiant intensity and beamwidth.

Hard-Kill Countermeasure Modeling

- Define the number of RF/IR array units and launchers on the platform and position them accordingly. Set individual coverage and response time for each system.
- Set the radar detection range/velocity/threshold values, range/Doppler/AGC filter and servo bandwidths.
- Set the IR sensor's operating band, field of view, FPA size, NEI and discrimination technique.
- Tailor the munitions' fuzing mechanism, intercept range and fragmentation pattern.

Threat System Modeling

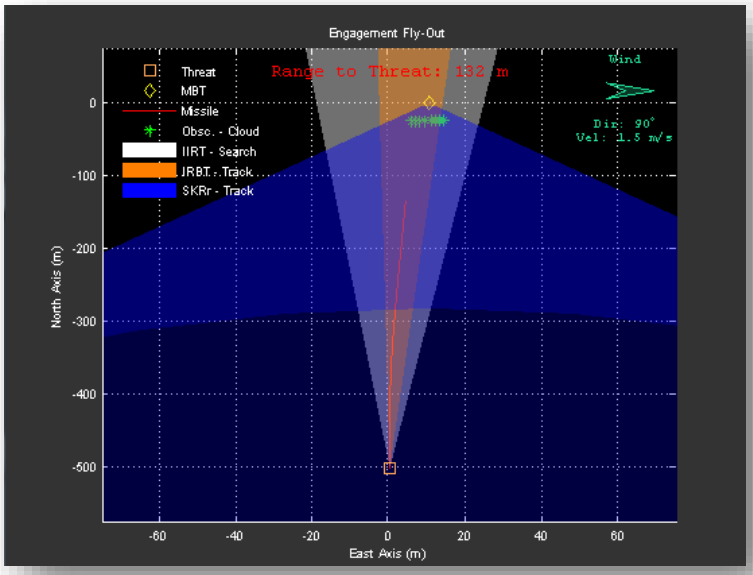
- Choose a SACLOS ATGM or an RPG.
- Define the initial launch position, angles and timing.
- Model the missile body dynamics by transfer function representations or using aerodynamic tables.
- Set the threat's IR/RF signatures using built-in tools.
- Characterize other subsystems such as guidance, autopilot, propulsion, and warhead.

Environment Modeling

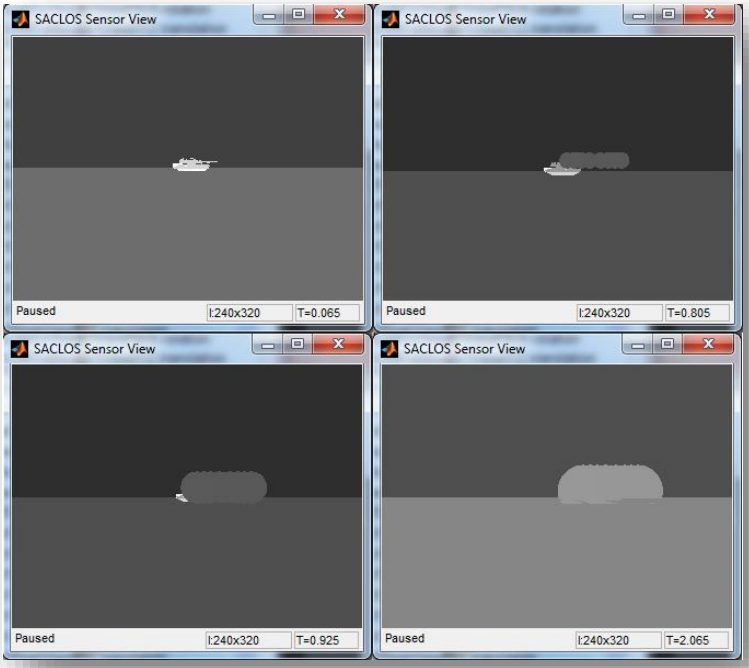
- Simulate both Rx and Tx environmental RF effects such as propagation losses, Doppler shifts, phase delays and IR atmospheric attenuation.
- Represent the ground-clutter model with selectable terrain types and RCS correlation times.

Simulation Outputs

- View 3D trajectory plots and dozens of default scopes.
- Record missile fly-outs for replay or further analysis.
- Compute several measures of effectiveness such as miss distance, probability of kill, probability of survival, seeker track/search percentage.
- Insert additional scopes to display signals of specific interest.



TESS 3D Trajectory Plot



TESS IR Scene Generator

TESS™ APPLICATIONS

Electronic Attack Development
Conduct research, development, testing and optimization of countermeasure techniques, deployment parameters and mode sequences in relation to particular threat characteristics in a wide range of tactical engagement geometries.

Threat Weapon Analysis
Analyze and characterize the performance and susceptibilities of threat weapons and subsystems. Reverse engineer threat characterization parameters in relation to tracking, guidance and aerodynamic performance factors.

Electronic Protection Development
Conduct research, development, and testing of electronic countermeasure-countermeasure techniques in relation to many types of countermeasures, both on-board and off-board, and a wide range of tactical engagement geometries.

EW Operational Support
Support the programming of operational equipment by developing effective tactical programs and data loads in relation to specific threats, engagement geometries and tactics.

Lab and Range Testing
Optimize and validate platform survivability in laboratory and field trial environments through trials planning supported by inexpensive but high fidelity software simulation trials. Carry out after-test results analysis to support trial documentation and report generation.