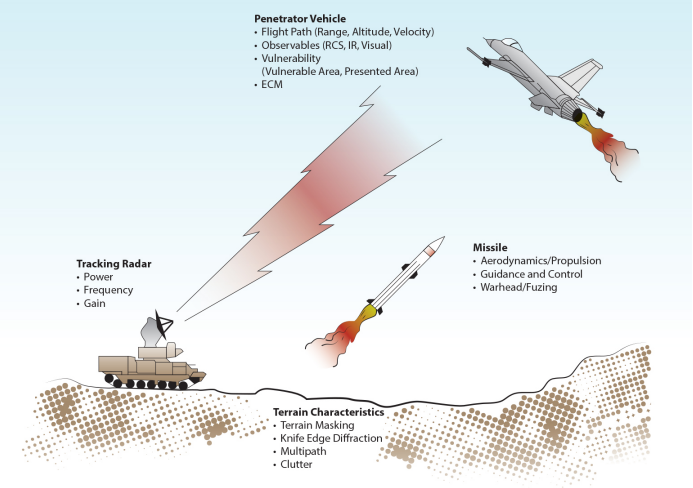
ESAMS

Enhanced Surface-to-Air Missile Simulation



ESAMS is a computer program used to model the interaction between an airborne target and a surface-to-air Missile (SAM) air defense system. Detailed data have been abstracted from intelligence information and incorporated into the model to provide comprehensive representation of radio frequency (RF) land-based and naval-based SAM systems. The user has the option of specifying the threat site layout in various ways, including rectangular grid site arrays, circular site arrays, or semi-circular arrays, or by specifying specific sites one-by-one. Missile fire control, guidance, aerodynamics, and movement are also patterned. The model details the characteristics of both ground and missile seeker radar. ESAMS models aircraft from their signature data and optional vulnerability data.

This simulation provides a one-on-one framework used to evaluate air vehicle survivability, estimate effectiveness, set requirements, and develop tactics. The ESAMS model simulates many elements of a SAM engagement, including RF radar performance, countermeasure algorithms, environmental factors, tactics, and endgame. ESAMS can execute simple, straight and level, or complex flight paths. The flight path generator application, BlueMax6, has been incorporated into ESAMS and can be invoked with an input parameter. Additionally, a user can specify that the aircraft execute a special set of maneuvers in reaction to specific event situations, such as a missile approach. The aircraft can also be instructed to make a final terminal maneuver to attempt to avoid the missile if impact appears imminent.

Further, the model can simulate various environmental effects, including atmosphere, terrain, multi-path, and clutter. ESAMS can simulate the effects of wind on both aircraft and missiles. The model uses either a curved or flat earth model for masking checks. ESAMS can be run with native (bald earth with a homogeneous surface) or digital terrain input. When native terrain is used, the model calculates its own back-scatter values. With digital terrain, the Ground RAdar Clutter Estimator (GRACE) is used to access site masking and generate back-scatter coefficients for site-specific terrain.

Input

The ESAMS model consists of software processing components and a simulation database containing missile, target, and environmental characteristic files. ESAMS can be run with or without a SAM file. SAM files provide the data used to model a particular aircraft/SAM combination; it also instructs the program as to which data files are required for the run. The most common execution configuration for ESAMS requires the use of a binary SAM file and a user-prepared input file. The ESAMS user can input multiple 4π signatures, electronic countermeasure descriptions, antenna patterns, target skin files, and vulnerability files. Common blocks and overlays are input directly into ESAMS, where overlays supersede corresponding common block inputs. Vulnerability data, consisting of glitter point data, blast data, vulnerable component data, and miscellaneous variables, are required only if an endgame analysis is desired and vary with the type of endgame option selected.

Output

ESAMS output reports can be produced in either block or column formats. Outputs can be printed to a file or sent to the monitor as directed by the user. Users also tailor the run results to show relevant information. If the event output flag is turned on, the output will include event messages, such as target acquisition and target tracking. If a missile is launched, several additional messages are output. Detailed missile flyout data are provided throughout the flight, including missile thrust, weight, velocity, angle of attack, and seeker tracking data. When the summary output flag is activated, the output will include run summaries, such as missile flyout, missile site, and runs. ESAMS also adds an echo of the inputs to every report. Finally, ESAMS includes logic to provide detailed endgame calculations. Miss distance, closest approach, Pk, Pk due to blast, and Pk due to fragmentation are reported when the endgame is enabled.

HOST SYSTEMS: Linux, Windows
PROGRAM LANGUAGE: FORTRAN 90