Focus on CSIR

CSIR Radar Threat Simulators

High fidelity simulation of the modern threat environment for electronic warfare system testing and training.

The CSIR's radar threat simulator (RTS) solutions simulate the modern electromagnetic threat environment in high fidelity for a variety of electronic warfare (EW) training, test and evaluation applications.

The CSIR's modular RTS payload design allows multiple cost-effective RTS system configurations. These include an airborne pod-based configuration, an open-air ground-based configuration, as well as a laboratory configuration that addresses the full spectrum of threat simulation needs from system development to operational testing and training.

Capabilities

The CSIR's RTS solutions provide the key capabilities required for the simulation of the modern emitter threat environment, including:

- Highly programmable radar waveform and behavioural models, enabling simulation of modern pulsed or CW radars in high fidelity. Configurable parameters include beam and scanning patterns, modulation-on-pulse, frequency hopping and PRI modulation.
- Arbitrary waveform generation – playback of communications or transponder signals, as well as user-defined waveforms.
- Simulation of dense spectrum and multiple time-overlapping waveforms per RF channel.
- Frequency ranges from 0.5 to 40 GHz, and dynamic ranges of more than 60 dB.
- Synchronised multi-channel operation for the stimulation of system under test (SUT) angle-of-arrival functionality.

Applications

The multiple configurations of the CSIR's RTS solutions address the full spectrum of RF threat simulation needs. The RTS systems are intended for operation against radar warning receivers, electronic attack (EA) and electronic support (ES) systems, as well as SIGINT systems. Applications include:

- Laboratory or anechoic chamber testing and verification of EW systems during system development and integration.
- Operational test and evaluation exercises against land-based, ship- or airborne EW systems.
- Training of personnel with realistic threat simulation during operational test exercises or mission rehearsals.
- Automated testing of receiver systems against a defined library of threat emitters, or performance testing within specific engagement scenarios.

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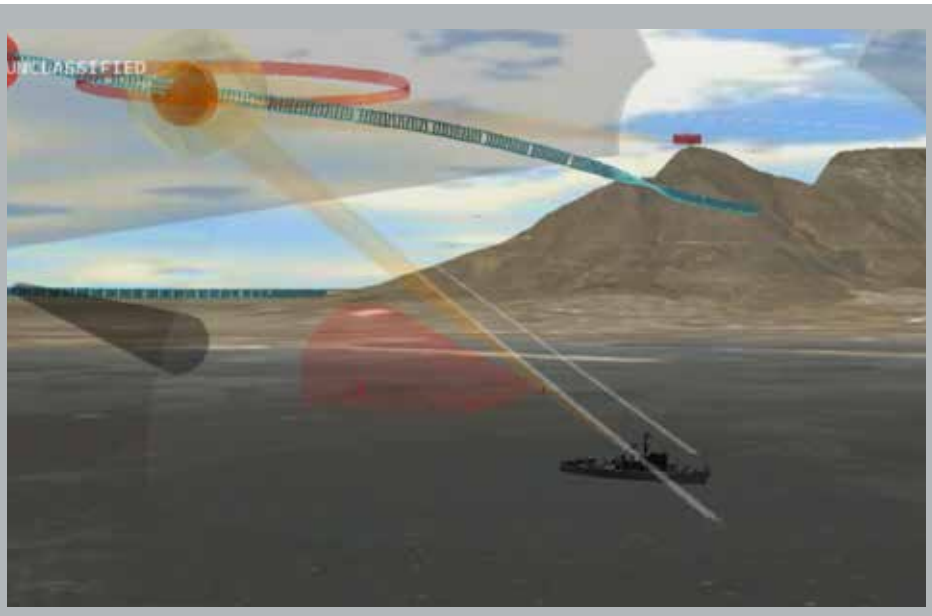

Laboratory-based RTS

The CSIR's laboratory-based RTS integrates modular RTS hardware with a highly configurable simulation setup and visualisation GUI for the creation of a dynamic multi-emitter environment simulation (MEES). The multi-channel RTS couples directly to the SUT antenna input ports to provide RF signals according to a simulated scenario, as defined in the RTS GUI. Alternatively, the SUT antennas may be stimulated within an anechoic chamber or hanger. The SUT and emitters are modelled within the GUI, with fully configurable antenna beam patterns, scan patterns, and detailed emitter models. The SUT and defined emitters are assigned to platforms, each with a position and configurable motion model within three dimensions to define a dynamic engagement scenario.

Typical specifications

SYSTEM

- 0.5 – 40 GHz RF operating range.
- 1 GHz waveform IBW.
- Up to 16 time-overlapping waveforms.
- 60 dB dynamic range.
- Greater than 1 Mpps per RF channel.
- Arbitrary waveform generation – playback of user-provided emitter waveforms.
- Direction finding simulation for amplitude, phase and time difference of arrival.

SCENARIO PARAMETERS

- More than 2000 simultaneous emitters in scenario.
- Full three dimensional target motion models with six degrees of freedom.
- Modelling of terrain, obstruction and RF fading effects.

EMITTER MODELS

- PRI range from 1 µs to 1 s
- 8 ns PRI resolution
- 32 ns to CW PW range
- 8 ns PW resolution
- PRI modulations:
  - Fixed, groups, fixed, jitter, stagger, burst, groups, triangular, exponential, saw tooth, sinusoidal ramp, user-defined
- Antenna beam patterns:
  - SinX/X, CosX ,Cos2X ,Cosec2X, Omni, Gaussian, Chebychev, Taylor, user-defined
- Pulse-to-pulse modulations:
  - Fixed, hopper, group, user-defined
- Modulations on pulse:
  - Barker codes, Frank codes, chirp, bi-phase
- Scan patterns:
  - Fixed, circular, conical, helical, spiral, nodding, lobing, raster, sector, track while scan, user-defined

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