

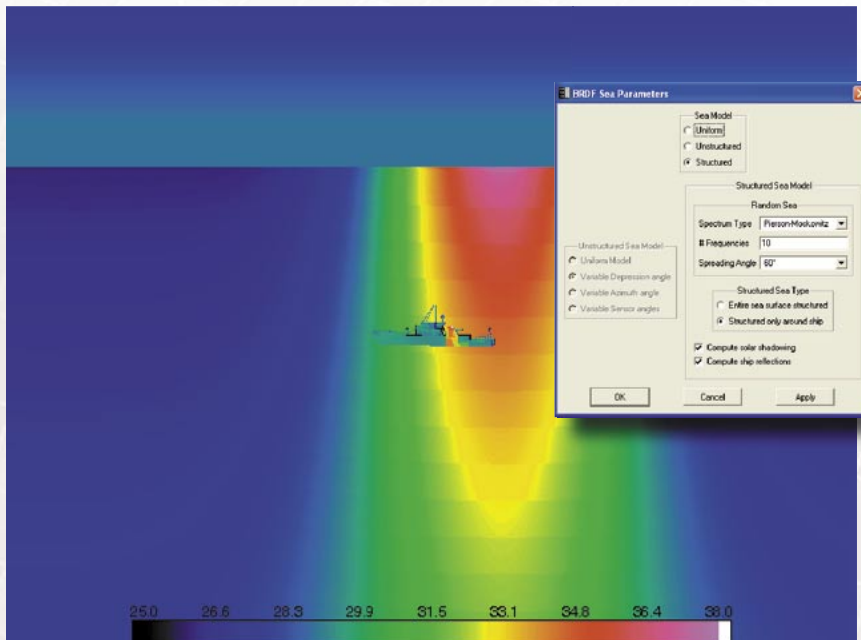
# MuSES 7.1

## IR Signature Prediction Software

MuSES (Multi-Service Electro-optic Signature) is an advanced thermal and infrared signature prediction program from ThermoAnalytics. MuSES will let the infrared analyst or specialist perform complete thermal modeling and infrared signature prediction within an integrated easy-to-use interface.

MuSES's highly-optimized algorithms handle even the most complex IR questions. Written entirely in C++, MuSES maintains speed and cross-platform compatibility across Windows, Linux, HP, SGI, and Sun computers. A state-of-the-art voxel-based ray tracer is used to compute view factors, solar projected (apparent) areas, radiosity, and apparent temperature. This ray tracer provides the fastest thermal and infrared solver on the market.

Natural environments are supported through weather data files and solar loading based on global position. MuSES can also use atmospheric data from MODTRAN. Multi-bounce solar radiation is automatically calculated including greenhouse effects from solar radiation transmitted through glass. Faceted-terrains provide full target-background interactions, including reflections and shadowing.



### Principal Features

#### Complete Thermal Analysis

- Multi-bounce Radiation
- Conduction
- Convection
- 1-D Advection
- Natural Environments

#### Infrared Signature Prediction

- Sky and Terrain Reflection
- BRDF Rendering
- Spectral Paint Surfaces
- Faceted Backgrounds

#### Multiband Prediction

- Apparent Temperature
- Radiosity

#### Target Backgrounds

- Terrain
- Foilage
- Multiple Surface Types

### Benefits

- Faster Product Development
- Model Building and Solutions
- Easily Interfaced to Sensor Models

“MuSES has consistently predicted accurate radiance for targets ranging from desert plateaus to the north Atlantic.”

-Senior Engineer

### Common Applications

- Survivability / Hit Avoidance
- LO Design Analysis
- Signature Optimization

# ThermoAnalytics, Inc.



## Version 7.1 Features

### Preprocessing

**Local coordinate system** for fast model setup

**CFD Results** Import Wizard simplifies convection import with automatic mesh mapping

**Model Parameter Display** Colors Geometry by convection coef. or fluid temperature values

### Model Setup

**Fluid Connections** Window displays connections to surfaces and advection links

**Component Model** files import as assemblies with BC's intact

**User Routines** extend the power of RadTherm to vary BC's mathematically, while hook functions give node-level control

### Analysis

**Thermal Links** Connect any surface element to any other without geometry or view factor recalculation

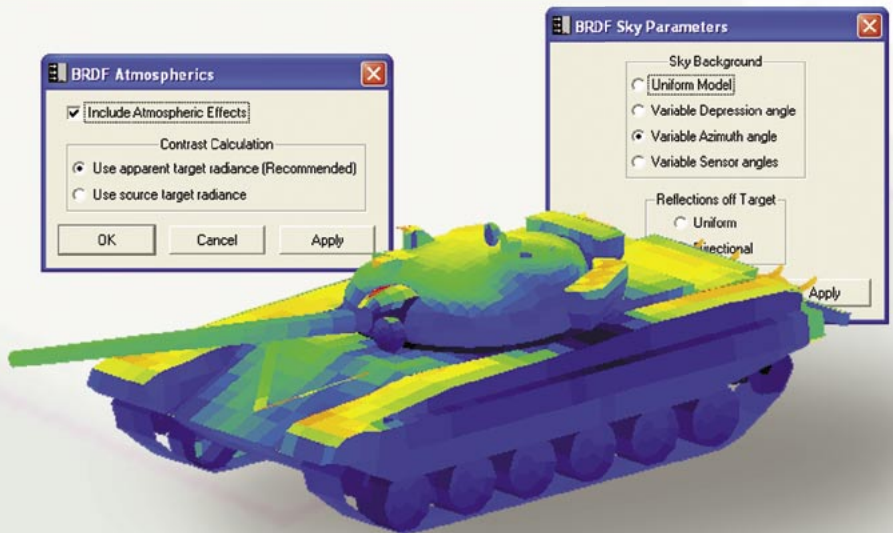
### BRDF Post-Processing

**Multi-Bounce BRDF** Sanford-Robertson band-specific rendering w/ background & sky

**Senor Path Attenuation** is now predicted with aerosol models or user-specified visibility

**Distributed Sky Dome** yields accurate reflections off target

**Senor Path Attenuation** is now predicted with aerosol models or user-specified visibility



**Predict Signature Data** The Infrared Signature post-processor displays physical temperatures, in-band radiances, and apparent temperatures for every element or facet. Running the BRDF solver allows the user to predict target and background specular radiance images into a pixelized format.

**Improve your Design** Import your surface geometry and change designs with ease. Manipulate the geometry within MuSES to improve heat management and understand IR signatures relative to a time-varying environment or operating conditions.

**Utilize Faceted First Principle Backgrounds** To predict accurate target/background contrast levels, MuSES fully supports faceted backgrounds. Create or import a faceted terrain. Apply one or multiple background types to your geometry. Calculate accurate temperature/signature solutions – including full target background interactions.

**Integrate with CFD** Seamless integration with CFD results (including FLUENT and STAR-CD) allows increased accuracy for convection.



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