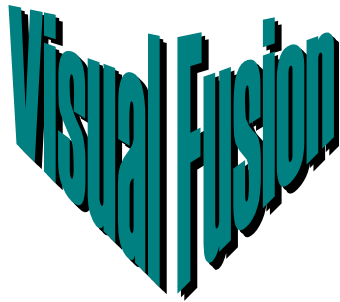


VISUAL FUSION Radiometric Calibration and Signature Analysis



VISUAL FUSION can be used to perform radiometric calibration on both resolved and unresolved targets using infra-red (IR) detectors. Calibration results in target radiance, radiant intensity, or equivalent black body temperature can be obtained. The true power of this capability becomes apparent when one examines the time history of a target radiance or temperature (signature analysis) to infer target dynamics.

Radiometric Calibration

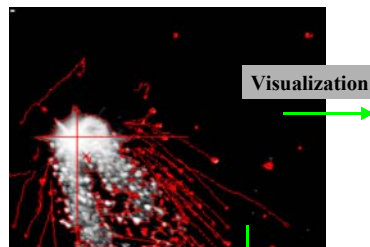
The radiometric calibration allows you to perform a pixel-by-pixel two-point (gain and offset) correction, eliminate bad pixels, and compensate for wavelength non-linear detectors. It also supports dynamic, frame wide gain and offset correction (e.g. from an automatic gain correction circuit).

In calibration mode, VISUAL FUSION allows you to easily generate bad pixel maps for both "hot" and "cold" bad pixels. A flat field gain correction file can be generated from a sequence of dark frames, or a more sophisticated pair of gain and offset images can be generated from a sequence of calibrated flat field images.

A handy black body calculator allows you to compute the black body radiance at a temperature, plot

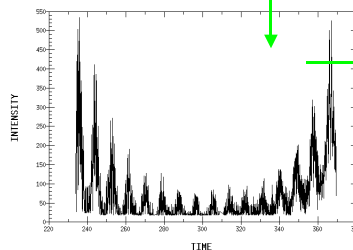
the black body curve for a given temperature, or tabulate the integrated radiance within a waveband as a function of temperature.

signature. An example is shown in the diagram. The intensity versus time of an unresolved target is plotted. In the signature plot, one can see exo-atmospheric cooling

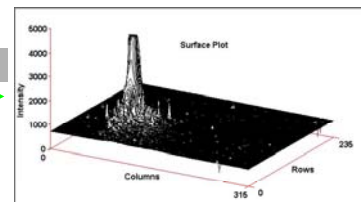


Visualization

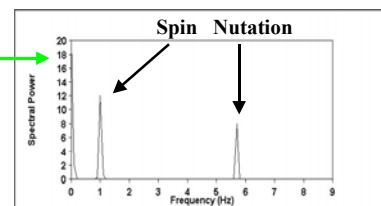
Intensity Plot



Intensity Signature



Surface Plot



Intensity Spectrum

Signature Analysis

Radiometric calibration is only half of the story. VISUAL FUSION combines radiometric calibration with tracking to build time histories of targets, thus giving the analyst a target intensity (radiance or temperature) over time – the target

and re-entry heating, overlaid on a number of peaks, each of which has finer structure. An FFT reveals a 1 Hz spin component, and a 5.7 Hz nutation (wobble) component.

Technical Reference

- *Radiometry Using a Platinum Silicide Detector*, J.N. Sanders-Reed, *Opt. Eng.*, **36(1)**, Jan. 1997.

Developed by analysts, for analysts.

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- Resolved or Unresolved Targets
- Target Radiance, Radiant Intensity, or equivalent Black Body temperature
- 2 point correction on a pixel-by-pixel basis
- Dynamic frame wide gain and offset
- Bad Pixel elimination
- Black Body calculator