

# NASA TECH BRIEF

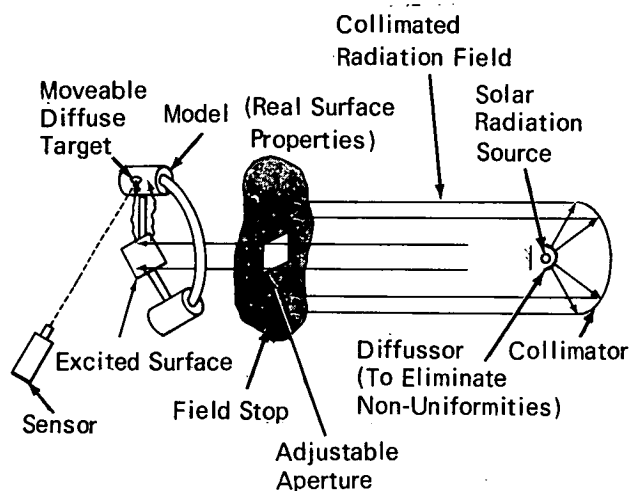
## Manned Spacecraft Center



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### Technique for Experimental Determination of Radiation Interchange Factors in Solar Wavelengths

A new experimental process obtains solar heating data which support analytical design. The process is capable of yielding quantitative information on the local solar exposure of models which are geometrically and reflectively similar to prototypes under study. These models can be tested in a shirtsleeve environment.



Schematic Representation of Setup for Experimental Determination of Radiant Interchange Factors

The process requires the model itself, a collimated radiant field which simulates the solar spectrum, a diffusely reflecting target which is small relative to any model surface, a remote radiation detector with a narrow field of view, and a fixture for holding the model in some desired orientation relative to the radiant (see fig.). The experimental method does not require a knowledge of shape factors, solar incidence factors, bidirectional reflectances, or interreflection coefficients.

An analytically tractable model having real surface finishes was tested, using the sun as the radiant source and a photometer as a detector. The simple, rapid, accurate measurements yielded the nondimensional local solar irradiation at all points on the model surface. This measured value was multiplied by the product of the local solar absorptance and the solar constant,  $\alpha S$ , to obtain the net solar flux at a specific location. A comparison between analytical predictions and experimental results indicated that local solar irradiation on a model may be measured with an accuracy comparable to the measurement of surface reflectance. The ease and accuracy of the process suggest its applicability as a thermal engineering design tool.

**Note:**

The following documentation may be obtained from:

National Technical Information Service  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$0.95)

**Reference:**

NASA-CR-101945 (N69-39198), Empirical Determination of Radiation Interchange Factors

**Patent status:**

No patent action is contemplated by NASA.

Source: Richard P. Bobco, Leo J. Nolte, and James R. Wensley of Hughes Aircraft Co. under contract to Manned Spacecraft Center (MSC-13476) Category 03