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Workshop #13 – Gray Body Radiation

This lab is best done with a radiation source that is provided to the students. The power required is more than available from their computers.

Additional Equipment Required

- A Heater that is 5" x 5" in dimensions or larger
- A similar sized piece of aluminum plate (1/8" thick works well)
- Black spray paint
- Steel wool

For a six-inch square plate with an electric resistance heater on the back requires at least 10 watts of power to reach 80° or 90°C, which makes it easy for the students to feel the radiation from the plate. A 1/8 inch thick aluminum plate placed this on some type of thermal insulation works well. Use some flat black spray paint to cover one-half of the plate. Polish the other half of the plate with steel wool or the equivalent. This should provide a very measurable difference in radiation heat flux that can both be felt by the students and measured with the heat flux gage. With some simplifying assumptions the emissivity of the bare metal surface can be measured. The workshop is very useful in helping the students appreciate the effect of surface emissivity on radiation exchange. It makes it seem real for them.