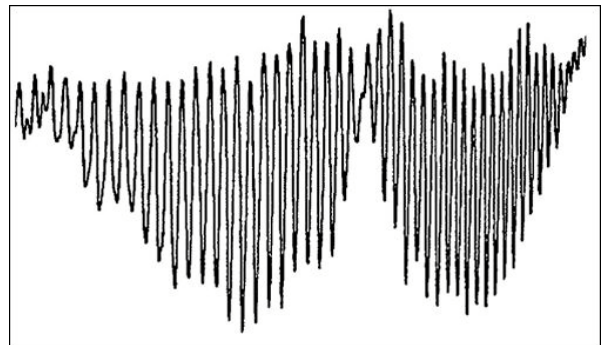


The Turbo FT™

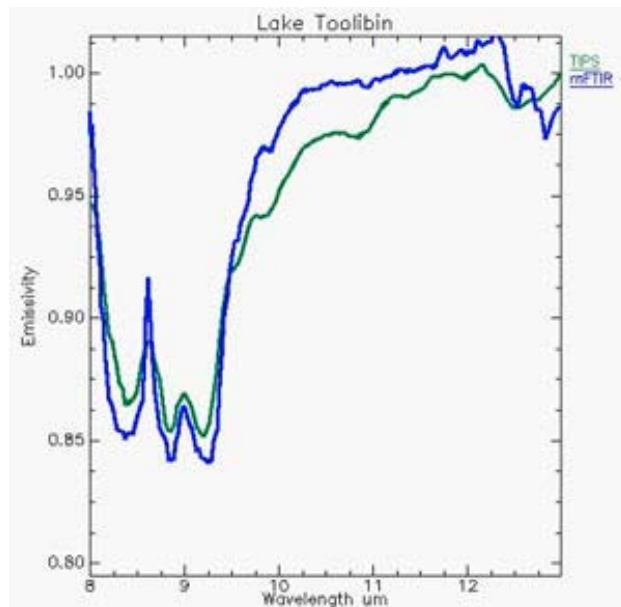
A Very Fast FT-IR/NIR Spectrometer

The Turbo FT is a patented, rotary scan interferometer which can achieve scan rates of 10-1000 scans per second. Also, due to its smooth, continuous scan, it can be run without the laser reference channel normally required in an FT-IR spectrometer. Its small size, ruggedness, speed, and very low power requirements make it an ideal candidate for high vibration environments both in the lab and out in the field.

It has been run laserless (i.e. time sampled) at up to 1cm⁻¹ resolution, producing the spectrum shown at the right. This spectrum is the atmospheric CO₂ band at 4.3 micrometers, which consists of a series of sharp lines that are about 1cm⁻¹ wide. The lineshape at this resolution has been found to be very good.



The Turbo FT is currently being used in an airborne application for geophysical remote sensing of TIR/NIR spectra of the ground. Its high speed of 100 scans per second makes it insensitive to vibration and allows excellent ground resolution of spectra. With its current optics, the ground pixel is 10 X 10 meters.



The figure at the left shows some results obtained by this instrument at Lake Toolibin in Western Australia. The plot shows absolute emissivity spectra of kaolinite, one from the TIPS (Thermal Infrared Profiling Spectrometer) airborne instrument, the other from our Model 101 mFTIR ground truth spectrometer, which was used to verify the aircraft data. The Model 101 (and current Model 102) use our Micro FT interferometer, plus our temperature controlled blackbodies and other accessories, to collect the field data required for calibrated measurements of absolute emissivity.

A second application for the US Army is as an imaging spectrometer for remote sensing of chemical plumes from both moving vehicles and aircraft platforms. This spectrometer uses a 16 element mosaic detector and large telescope to provide up to 360 scans per second. This configuration has been tested in the field at 1.5 km standoff distance in desert conditions. The chemical of interest was detected in multiple pixels. Further testing in 2002 & 2003 resulted in chemical detection from a helicopter platform at 1 km stand-off distance to the ground.

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