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NANOSATELLITE MISSION OVERVIEW WITH A SLAB WAVEGUIDE SPATIAL HETERODYNE SPECTROMETER PAYLOAD

Abstract

The mission architecture and concept of a new type of waveguide device, a multiaperture Fourier-transform planar waveguide spectrometer[1], is presented. These spectrometers offer high resolution, increased throughput (etendue), no moving parts and are compatible with a nanosatellite platform[2]. Development of miniature infrared spectrometers that are robust and environmentally reliable is of great interest for space-borne sensing and spectral imaging.

The spectrometer will use a solar occultation configuration to detect the 1.36um waveband allowing concentrations of water vapor in Earth's atmosphere to be measured[3]. The objective of the spectrometer is to make global measurements of water vapor from 10 to 80km above Earth's surface at 1km vertical resolution.

Non-uniformities of input brightness and fabrication errors will affect the performance of the waveguides, therefore focus will be given to calibration algorithms and data processing algorithms developed to mitigate this. The output from the array detector comes in the form of a power interferogram which is Fourier Transformed in order to perform spectral retrieval. The most challenging aspects of the mission's concept including the occultation configuration and instrument's coverage are presented.

REFERENCES

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