Abstracts

A Very Sensitive Airborne Microwave Radiometer Using Two Reference Temperatures

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The accuracies of conventional microwave radiometers are influenced by instabilities mainly in their RF components A radiometer is described that uses two reference temperatnres. The signal processing eliminates the influences of all RF parameter changes on the radiometer indication. Thus the overall stability depends only on the reference temperatures and the low-frequency and dc components. These can be made extremely stable by careful design. The paper presents a detailed analysis of the radiometer performance. The minimum detectable signal is greater than that of a comparable Dicke radiometer, but approaches this, if the reference temperatures are appropriately chosen according to the particular measurement problem. The great advantage of the radiometer is that no measurement time is lost for frequent recalibration. Practical results of an X-band radiometer for airborne use are given at the end of the discussion. They are in good agreement with the theory and demonstrate the feasibility and superiority of the concept.

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