Abstracts

An Investigation of a Feedback Control System for Stabilization of Microwave Radiometers

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A method of stabilizing receivers for radio telescopes is discussed and shown to be capable of substantially reducing sensitivity to gain fluctuations. The system employs a variable noise source as a controlled feedback element. Such a system does not require long warm up times since the output is dependent only upon the stability of the variable noise source and reaches stabilization very rapidly. Investigations were made of a number of variable noise sources for use in the system, includlng: gas discharge tubes with variable attenuators, crystal diodes, and gas discharge tubes with variable duty cycles. Several crystal diodes were measured and the noise output was found to be linear with current for temperatures up to approximately 5000°K. A variable noise source using a gas discharge tube with variable duty cycles to adjust the average temperature of the comparison termination of the radiometer is also discussed. Results are given for an experimental X-band system using a crystal diode as a variable noise source. For this system, a reduction of gain by 5 db had no measurable effect on the accuracy of measurement.

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