Abstracts

Traveling-Wave Masers for Radio Astronomy in the Frequency Range 20-40 GHz

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Tunable rutile traveling-wave masers (TWM's) have been developed for the frequency ranges 20-25 GHz and 29-35 GHz. Operating data for iron-doped rutile are given and the optimum concentration of iron has been determined. A new type of dielectric image line slow-wave structure (SWS), particularly useful in the frequency range 10-50 GHz, is used in two of the masers. This SWS is found superior to the other structure tested, the dielectrically loaded waveguide. For both types of masers, a ferromagnetic isolator is used in order to ensure the gain stability of better than ±0.2 dB at 30 dB net gain, required for radio astronomical applications. The instantaneous 3dB bandwidth is 30-60 MHz, depending on the maser. The maser package noise temperature at the input waveguide flange was measured to 27 ± 4 K.

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