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Microwave frequency tuning of an ECR ion thruster KAZUTAKA NISHIYAMA, Japan Aerospace Exploration Agency — Microwave power reflection of a 20-cm xenon ECR ion thruster for spacecraft propulsion should be decreased because the incident microwave power of 100W is nearly the maximum power for light-weight coaxial cables and high reflectance may damage the microwave components and degrades thrust efficiency. Impedance matching characteristics of the thruster has been experimentally investigated by adjusting the microwave frequency by one percent without using any mechanical tuners which is not suitable for space applications. The ion thruster should work at xenon flow rates between 4 and 13 sccm (standard cubic centimeters per minute). In that operating range, the best frequency was 4.266 GHz with only 1% of reflectance at the maximum flow rate. Frequency offset by only 0.6% reduced the thrust by 30% due to a very high microwave reflectance of 43%. When the flow rate was decreased to the minimum level, the frequency little affected the thrust performance and the reflectance and reflectance of 30% at that condition was acceptable.

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