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INVESTIGATION ON MAGNETRON CAVITY APPLIED IN RUBIDIUM ATOMIC CLOCK

**Abstract**

Microwave cavity is an essential and important component for rubidium atomic frequency standards. Based on the theoretical calculations, a kind of magnetron cavity for rubidium atomic clocks is developed, through which the main characteristics of the magnetron cavity were studied, mainly including the resonant frequency, quality factor and oscillation mode. The results show that the resonant frequency of the magnetron cavity can be attenuated to 6.835GHz, which is the resonant frequency for the rubidium atoms, the Q-factor and oscillation mode can meet requirements for rubidium atomic frequency standards. Based on the magnetron cavity, a kind of Cavity-cell assembly for rubidium atomic frequency standards is also designed, and experiments to study frequency temperature coefficient, line width and microwave-power frequency shift is developed. The cavity-cell assembly based on the magnetron cavity has a lower frequency temperature coefficient, the line width is between 200-300Hz, and the microwave-power frequency shift can be improved to exceed  $3.5E-12$ /dB. After modulation and improvement of the cavity-cell assembly, the 1S stability of rubidium atomic clocks based on the magnetron cavity can exceed  $3E-12$ .