
Stability of stationary vibrations of cylindrical gyro resonator with electromagnetic control system

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The article considers dynamics of a cylindrical resonator of the wave solid-state gyro with an electromagnetic control system allowing reducing the instrument readiness time for operation comparing to electrostatic control system. The mathematical model describing the resonator vibrations and the electromagnetic processes in the vibration excitation system in the coherent manner is created. It is shown that when the positional excitation is used attendant parametric excitation of vibrations appears. The case is considered when the simultaneous action of forced position excitation and attendant parametric excitation results in combined vibration. Using a method of splitting the non-autonomous systems of differential equations with periodic matrices and Lienard – Shepherd criterion of stability the condition of asymptotic stability of stationary vibrations of gyro resonator is obtained. The regions of asymptotic stability of stationary vibrations of gyroscope resonator in the space of system parameters are constructed.

Keywords: wave solid-state gyro, cylindrical resonator, parametric excitation, stability of vibrations.

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