

# METHODS OF CALCULATING THE LOAD CHARACTERISTICS OF RING DAMPERS OF THE MR MATERIAL WITH PARTIAL COVERAGE OF A BEARING WITH PRECESSIONAL LOADING

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The paper shows the method of calculating elastic and damping characteristics of ring damper made of the MR material with partial coverage of the coaxial space between a support and a cylindrical vibrating bearing. Shown that a precessional loading results in elliptical hysteresis loops at projections on coordinate axes of damper. The magnitude of reactions depends on the geometrical parameters of support, the density of the wired material MR, prior tightness of damper. Found that the volume of a gap in the ring damper deforms the elliptical shape of hysteresis loops and their orientation in the coordinate system of load characteristics.

*Damper, hysteresis, material MR, calculating, damping characteristics*

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## References

1. Kotov A.S. Investigation of quantitative characteristics of the technology of production of MR material/ A.S. Kotov, Y.K. Ponomaryov, F.V. Parovay // SSAU Bulletin. Problems and Perspective of Engine Designing Series. Samara, 2006, Pt.2. 397-401.

2. Ulanov, A.M. Fundamentals of vibration protection systems with elastic elements of the MR material / A.M. Ulanov, Y.K. Po

nomaryov // Samara Science Center of RAS Bulletin, volume 10, № 3, July – September 2008. - p. 853 – 857.

3. Ponomaryov, Y.K. Development of mathematical model of vibration-isolator with spherical damping element of the MR material / Y.K. Ponomaryov [and others] // SSAU Bulletin. Problems and Perspective of Engine Designing Series: - Samara: SSAU, 2006.- Pt. 1.- p. 392-397.