

**MOTION OF ROTOR AT RUNDOWN UNDER SPECIAL CONDITIONS OF SUMMANDS OF TOTAL MOMENT OF ROTATIONAL DRAG**

The study focuses on the pressing problem of an analytical validation of the integral characteristics of the rotor systems for further balancing the rotors at rundown (at start). This allows dismissing the contact vibration pickups and other special instruments for monitoring the balancing process. The work aim is to develop an algorithm of the determination of the integral characteristics of the rundown rotor system in the presence of a special relation (a positive discriminant) of the coefficients of moments, which are summands of a total moment of rotational drag. A one-to-one sequent algorithm is built to determine an axial moment of the rotor inertia, the needed coefficients of the equation of a total moment of rotational drag, a total frictional characteristic, a reduced mass of the rotor, and an axial location of the center of mass. Four starts would suffice to determine these magnitudes. The presented disturbances of the rotor system are graded. A general approach to the solution of the problem without the method of least squares in full measure is presented. This obviates the solution of the multi-modal optimization problems and a choice of an optimization criterion.

**Keywords:** *rotor system, balancing, rundown, friction, mass, and geometric characteristics of rotor, moment of rotational drag.*

1. *Den-Hartog J. P. Mechanical Vibrations (in Russian) / J. P. Den-Hartog.* – Moscow : GIFML, 1960. – 580 p.
2. *Goldin A. S. Vibrations of Rotor Machines (in Russian) / A. S. Goldin.* – Moscow : Mashinostroenie, 2000. – 344 p.
3. *Levit M. Ye. Handbook of Balancing (in Russian) / M. Ye. Levit.* – Moscow : Mashinostroenie, 1992. – 464 p.
4. *Voloshenko V.V. Determination of mass and geometric, friction characteristics of rotor systems at rundown in case of stable moment of rotational drag (in Russian) / V. V. Voloshenko, M. N. Trubitsin // Proceedings of VII Conference of Students, Post-Graduate Students, and Young Scientists “Naukova Vesna- 2016”, Dnipropetrovsk. – Dnipropetrovsk : DVNZ NGU, 2016. – Vol. 5. – P. 18 – 20.*
5. *Tagan Ye. R. Motion of rotor at rundown in case of zero discriminant of total moment of rotational drag (in Russian) / Ye. R. Tagan, M. N. Trubitsin // Proceedings of VII Scientific-Technical Conference of Students, Post-Graduate Students, and Young Scientists “Naukova Vesna-2016”, Dnipropetrovsk. – Dnipropetrovsk : DVNZ NGU, 2016. – Vol. 5. – P. 8 – 9.*