# New Theory of Rotor Dynamics: Dynamics of the Disk Rotor Fixed in Support with Nonlinear Rigidity

Alexander Y. Zhivotov
Apt.148, 8, Yangel st., 49089,
Dniepropetrovsk, Ukraine
Phone: (38) (0562) 92-50-11
Fax: (38) (056) 770-01-25
E-mail: kbu@public.ua.net

## ABSTRACT

Centrifugal stands have found wide application in rocket technical for experimental researches. Usually, at these stand test details of rockets. Details check on durability.

Such experimental stands usually are called as centrifuges. Test centrifuges contain a rotor for fastening details. The rotor is suspended vertically in one point on a floppy shaft. In addition, the floppy shaft fastens in elastic support with absorbers of fluctuations.

In the given paper the new equations of dynamics for the unbalanced rotor fixed in support with linear rigidity are resulted. The opportunity of transformation of these equations for the description of dynamics of the rotor fixed in support with nonlinear rigidity is shown. Nonlinear characteristics of support depend on speed of rotation of an unbalanced rotor.

The analysis of dynamics of the rotor fixed in support with nonlinear characteristics is resulted. Dependences for definition of critical speed are specified. Conditions of transition of a rotor in a supercritical mode of rotation are specified in view of a parameter of nonlinear rigidity of support.

Formulas for calculation of key parameters of rotation of a rotor on various modes are resulted. To physics of process of rotation of a rotor pays special attention. For the description of dynamics of a rotor the simple algebraic equations are used.