

---

# The results of research tests of a new type actuator based on the effect of “Ultimate pneumatic hammer” in the radial gas-static bearing

© Yu.V. Peshti, I.S. Tkachev

Bauman Moscow State Technical University, Moscow, 105005, Russia

*The article considers a possibility of creating a drive based on the effect of “Ultimate pneumatic hammer” in the radial gas-static bearing. It summarizes the conditions of occurrence of the effect of “limiting pneumatic hammer”. We draw up recommendations on the application of the drive in the air conditioning systems of modern aviation aircraft, refrigeration. The prospects of the use of the drive as the rotating mechanism of intrinsically safe shut-off valve are shown. The first results of theoretical studies of gas-static bearings operating in the “limit pneumatic hammer” mode were obtained in a three-dimensional mapping. For the first time we present a stand for investigation of driving performance, as well as the first results on the basis of which we defined features of occurrence of the “limiting pneumatic hammer” mode. Also we found equations and the structure of the phase diagram, corresponding the regimes “pneumatic hammer” and “limiting pneumatic hammer”. Basic conditions for the appearance of the “limiting pneumatic hammer” mode were established. Also for the first time we clarified dependence, which leads to the effect of “limiting pneumatic hammer”. The basic design and operational requirements of the developed drive were determined. Analysis of the obtained results allowed to put forward further steps of development and the shape of a new drive.*

**Ключевые слова:** limiting pneumatic hammer, gas-static bearing, drive, air conditioning systems, aviation.

## REFERENCES

- [1] Peshti Yu.V. *Gazovaya smazka* [Gas lubrication]. Moscow, BMSTU Publ., 1993, 381 p.
  - [2] Trippet R.J., Oh K.P., Rohde S.M. Theoretical and Experimental Load-deffection. *Studies of a Multileaf Journal Bearing. Tipies in Fluid Film Bearing Design and Optimization: Presented of the Design Engineering Conference, Chicago*. Illinois, 1978, April, pp. 130–156.
  - [3] *Design Gas bearings*. N.Y., Mechanical Technology Incorporated, 1969, 673 p.
  - [4] Kunina V.V., Peshti Yu.V. *Vestnik MGTU im. N.E. Baumana, Ser. Mashinostroenie — Herald of the Bauman Moscow State Technical University. Series Mechanical Engineering*, 1998, pp. 151–159.
  - [5] Certificate of authorship no. 824714. *Sposob sozdaniya vrashchatel'nogo dvizheniya vala* [A method for creating a rotational movement of a shaft].
  - [6] Vygodsky M.Ya. *Spravochnik po vysshey matematike* [Handbook on higher mathematics]. Moscow, AST: Astrel, 2006, 246 p.
  - [7] Idelchik I.E. *Spravochnik po gidravlicheskim soprotivleniyam* [Handbook on hydraulic resistance]. Moscow, Mashinostroenie, 1992, 672 p.
-

---

**Peshti Yu.V.** (b.1933) graduated from Bauman Higher Technical School in 1957. Dr. Sci. (Eng.), professor of the Department “Refrigerating and Cryogenic Technology. Air Conditioning and Life Support Systems” at Bauman Moscow State Technical University. Author of over 120 publications in the field of cryogenic technology, air conditioning systems and gas lubrication.

**Tkachev I.S.** (b. 1985) graduated from Bauman Moscow State Technical University in 2008. Postgraduate student of the Department “Refrigerating and Cryogenic Technology. Air Conditioning and Life Support Systems” at BMSTU. Leading engineer-designer of the Department “Safety and life sustaining systems” at JSC “Technodinamika”.  
e-mail: TkachevIS@technodinamika.ru