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NON-LINEAR MODEL OF A TILTING PAD GAS JOURNAL BEARING FOR THE POWER MEMS MICROTURBINE

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ABSTRACT

A Power MEMS microturbine is a good solution when we need a portable micro energy source with a possibly high power density. The microturbine needs bearings which can operate stably with low drag at high speed and under heavy conditions. This is one of the most difficult technical problems connected with MEMS microturbines. Extensive research and development activities on that subject have been carried out since half of the 1990's.

The presented research has been conducted in order to compare theoretically a tilting pad gas journal bearing and the corresponding multi lobe gas journal bearing in the microscale application. The calculations have been made using a non-linear model of the tilting pad gas journal bearing. A low Length to Diameter (L/D) aspect ratio of journal bearings (resulting from the MEMS technology constrains) has been taken into consideration in the numerical model. The theoretical analysis results show an advantage of the stable operation range for the variable-geometry journal microbearing with the low L/D aspect ratio.

Keywords: non-linear model, tilting pad gas journal bearing, microbearing, microturbine, Power MEMS.