

Polymer Aerostatic Thrust Bearing under Circular Support for High Static Stiffness

Authors : Sy-Wei Lo, Chi-Heng Yu

Abstract : A new design of aerostatic thrust bearing is proposed for high static stiffness. The bearing body, which is made of polymer covered with metallic membrane, is held by a circular ring. Such a support helps form a concave air gap to grasp the air pressure. The polymer body, which can be made rapidly by either injection or molding is able to provide extra damping under dynamic loading. The smooth membrane not only serves as the bearing surface but also protects the polymer body. The restrictor is a capillary inside a silicone tube. It can passively compensate the variation of load by expanding the capillary diameter for more air flux. In the present example, the stiffness soars from 15.85 N/ μm of typical bearing to 349.85 N/ μm at bearing elevation 9.5 μm ; meanwhile the load capacity also enhances from 346.86 N to 704.18 N.

Keywords : aerostatic, bearing, polymer, static stiffness

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