Abstract: This study aims to tailor the bearing stiffness for enhancing the load carrying capacity of foil thrust bearings. New architectures for the bump foil are introduced with structural stiffness tailored in radial and circumferential directions to ensure a converging gas film under high axial loads while maintaining a reasonable bearing compliance to accommodate thermal as well as mechanical distortions. The flow in the gas film is modeled with 2-D compressible Reynolds equation including effects of centrifugal forces in the gas film. The Couette Approximation technique is used to calculate the temperature distribution in the gas film and small perturbations method is used to calculate its dynamic coefficients. Enhanced load capacity could be obtained with the introduced bump foil designs.

Keywords: Foil thrust bearing, stiffness tailoring, hydrodynamic lubrication, static and dynamic characteristics

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