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Theoretical study on a novel electromagnetically supported hydrodynamic bearing under static loads

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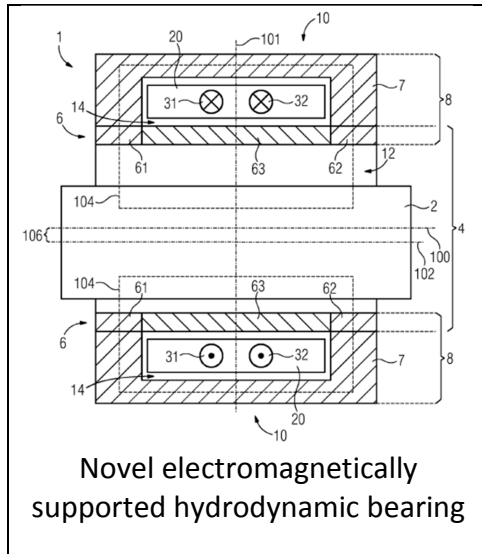
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$$Vo = \frac{2\delta^2 B_0^2 \pi L_m}{(\mu_0 \eta L^3 \omega)}$$

New number, similarly constructed to Sommerfeld number

$$\tan \gamma = \frac{2}{\pi} \left(Vo - \frac{2\epsilon}{\sqrt{1-\epsilon^2}} \right)$$

$$S^* = \frac{\pi}{2} \frac{\epsilon}{(1-\epsilon^2)^{3/2}} \sqrt{\frac{4}{\pi^2} \left(Vo - \frac{2\epsilon}{\sqrt{1-\epsilon^2}} \right)^2 + 1}$$

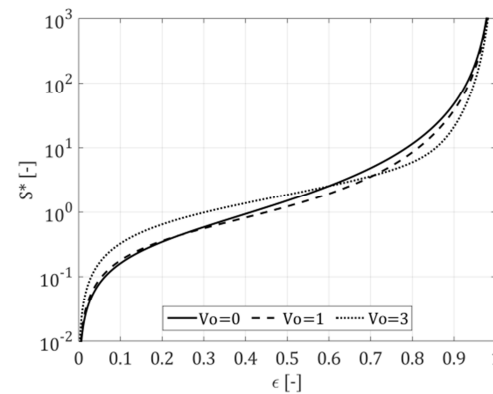
New governing equation system describing journal position of rest

Numerical Error about 0%

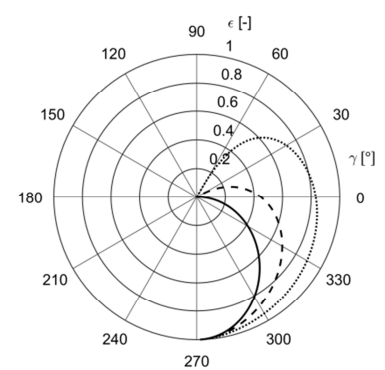
$$\partial_\alpha [\eta^{-1} h^3 \partial_\alpha p] + h^3 \partial_\beta [\eta^{-1} \partial_\beta p] = 6R\Omega \partial_\alpha h$$

$$(\nabla \psi)_i = g^{ik} \frac{\partial Y}{\partial q^i} \frac{\partial \psi}{\partial q^k}$$

Verification using Finite Difference Method



Semi-analytical equilibrium loci of the journal



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