ANALYSIS OF SQUEEZE FILM CHARACTERISTICS BETWEEN TWO CYLINDERS: NON-NEWTONIAN COUPLE STRESS FLUID MODEL

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Abstract

Grounded on the Stokes micro-continuum theory, the effects of non-Newtonian couple stresses upon the squeeze film behavior between two cylinders are theoretically investigated. The modified Reynolds-type equation governing the squeeze film pressure is derived to account for the couple stress effects resulting from the lubricant blended with various additives. Comparing with the conventional Newtonian-lubricant case, the couple stress effects signify an improvement in the squeeze film characteristics. Increasing the couple stress parameter increases the load-carrying capacity. By the use of couple stress fluids as the lubricant, the squeeze film system provides a longer time to prevent cylinder-cylinder contact and results in longer bearing life.

Key Words: micro-continuum theory, non-Newtonian couple stress fluids, squeeze films, cylinder-cylinder system

(A Revised Version)

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