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Multiscaling analysis of a nonlinear boundary value problem in lubrication theory. (English)

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Summary: The method of multiple scales, a long standing alternative to the method of matched expansions, is applied to the nonlinear boundary value problem modelling the operation of a one-dimensional gas lubricated slider bearing, at large values of the bearing number. Approximate expansions for the pressure profile, load bearing capacity and the location of the centre of pressure are obtained, and compared with the results of applying matched expansions and numerical techniques.

MSC:

76D08 Lubrication theory

76M45 Asymptotic methods, singular perturbations applied to problems in fluid mechanics

Keywords:

bearing; lubrication; multiscaling; perturbations

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