Foreword

In considering slow viscous flow in domains bounded either entirely or in part by rigid boundaries, it is helpful to understand from the outset the possible flow structure near any sharp corners on the boundary. In such neighborhoods, similarity solutions are available, which can provide valuable clues to the qualitative features that may be expected of the flow in the whole domain, and which serve as a useful check on the accuracy of the numerical procedures that are essential when the domain has complex geometry. The phenomenon of viscous corner eddies, which occur generically near corners bounded by fixed rigid planes, is of central importance in this context.

Even if the domain has no sharp corners, the corner solutions are nevertheless helpful in predicting the character of the flow near any point of the boundary where the curvature may be large, though finite. It makes good sense therefore to develop a good understanding of corner flows, starting with two-dimensional steady flows, and progressing as need arises to the various complications associated with unsteadiness and/or three-dimensionality. This provides a most helpful basis for the development of a general understanding of the structure of flows in which viscous effects dominate over inertia; and this in its turn provides a starting point for the study of flows in which inertia forces exert a perturbative effect, and also of flows of fluids for which non-Newtonian effects are non-negligible.

Dr. Shankar has adopted this general philosophy in approaching the subject of Slow Viscous Flows, and here provides a comprehensive introduction covering both analytical and numerical techniques, which should provide a valuable resource both for seasoned researchers and for all

students attracted to the delights of fluid mechanics. The applications are multifarious, in both geophysical and biological contexts, as well as in chemical and process engineering. I warmly commend this excellent treatment of the subject.

H. K. Moffatt
1 February 2007