

Preface

Localized deformation in the form of narrow shear bands are often observed to develop after large plastic deformations in metals, polymers and powders. Shear bands, being a form of large plastic deformation, are usually the precursors of ductile fracture. Therefore, an improved knowledge of localized deformation, including instability, shear bands, damage and fracture, is particularly significant for a wide variety of engineering topics. One example is material processing. Since the 1970s shear banding has been extensively studied by mechanical and metallurgical engineers. There is a pressing requirement in physics and engineering to summarize the knowledge gained and to assist students and researchers to apply this knowledge in their respective areas of technology.

The formation and evolution of these so-called adiabatic shear bands are a typical form of localized deformation. The importance of these tiny shear bands in materials failure in impact dynamics and metalworking has focused the interest of engineers on the phenomenon. The research that has been carried out in this area has produced a number of very interesting results. These may be helpful in further studies and applications.

We intend the book to be an explicit reference source on the topic of adiabatic shear localization. We hope that it provides a systematic description of various aspects of adiabatic shear banding, and that there is sufficient data available and case studies described to show how to apply the knowledge of adiabatic shear localization to various applications. Readers should easily be able to follow the different approaches and transfer the concepts and techniques to help solve the problems they encounter in their own areas. At the end of each

chapter, where necessary, there is a section called Further Reading, which includes some more advanced references.

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