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Nota di contenuto	CONTENTS; Foreword; Preface; Dislocation Dynamics in 2 + Dimensions: Slip Planes, Thin Films, and Grain Boundaries Yang Xiang, Siu Sin Quek, Yong-Wei Zhang, Adele T. Lim and David J. Srolovitz; Contents; 1. Introduction; 2. Peierls-Nabarro models for dislocations; 2.1. Classical Peierls-Nabarro model for straight dislocations; 2.2. Generalizations of Peierls-Nabarro model for straight dislocations; 2.3. Generalizations to curved dislocations; 2.4. From the Peierls-Nabarro model to a continuum dislocation dynamics model in a slip plane 2.5. Conclusions of Peierls-Nabarro models of dislocations3. Dislocation dynamics in thin films; 3.1. Dislocation dynamics simulation in thin film: A brief review; 3.1.1. Front-tracking methods; Two dimensions; Three dimensions; 3.1.2. Phase field method; 3.1.3. Level set method; 3.2. Level set simulation of dislocation dynamics in thin films; 3.2.1. Dislocation half-loop in a stationary film; 3.2.2. Pair of coplanar identical half-loops in a stationary film; 3.2.3. Non-

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3.2.4. Dislocation half-loops on intersecting glide planes in a stationary film

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5. Summary and discussions

Sommario/riassunto

The Institute for Mathematical Sciences at the National University of Singapore hosted a two-month research program on "Mathematical Theory and Numerical Methods for Computational Materials Simulation and Design" from 1 July to 31 August 2009. As an important part of the program, tutorials and special lectures were given by leading experts in the fields for participating graduate students and junior researchers. This invaluable volume collects four expanded lecture notes with self-contained tutorials. They cover a number of aspects on multiscale modeling, analysis and simulations for problems
