

Contents

Introduction	3
1. Dislocations as singularities of an order parameter	3
1.1. Volterra process for continuous homogeneous and isotropic (classical) elastic media	3
1.2. Volterra's process in a continuous, homogeneous but anisotropic solid medium. Perfect and imperfect dislocations	8
1.3. Volterra's process for crystals	10
1.4. Burgers circuit for elastic solids	12
1.5. Extension of the notion of Burgers circuit for rotation dislocations. Disclinations	13
1.6. Possible dislocations in some molecular crystals	14
1.7. Singularities in liquid crystals	16
1.8. Singularities in other order parameters [Toulouse and Kléman]	18
2. Cores of translation dislocations in crystals	20
2.1. Core cut-off [Volterra]	20
2.2. Dislocations as solitons [Dehlinger, Peierls]	20
2.3. Splitting of the core [Heidenreich and Shockley]	22
2.4. Atomic description of the core	23
3. Dislocation ensembles	24
3.1. Dislocation networks in strained f.c.c. metals	24
3.2. Dislocation networks in recovered f.c.c. metals	25
3.3. Deformation and recovery in other structures	25
3.4. Deformation of polycrystals	25
3.5. Inhomogeneities in deformation	26
4. New techniques for old problems	26
5. More complex materials	27
6. Physical properties other than plasticity	30
References	31