

# Index

## A

Adhesion, 4  
Adjoint problem, 87, 115  
Analytic Fredholm theory, 153  
Anisotropic elasticity, 37  
Asymptotic expansions, 176  
Automatic transmission, 207

## B

Beads, 93  
Biot–Savart integral, 168  
Biot–Savart law, 172  
Block copolymers, 197  
Born approximation, 129  
Brake squeal, 92  
Bridge fraction, 199

## C

Coda wave, 127  
COMA, 207  
Complex plane, 210  
Composite material, 102  
Contour integration, 210  
 $\Gamma$ -convergence, 15  
Convergent series expansions, 39  
Coulomb's law, 37  
Crack, 37  
Critical Reynolds number, 94

## D

Dislocation, 15  
Distributed computing, 208

Dundurs parameter, 40  
Dynamic frequency response, 209

## E

Earthquakes, 143  
Eigenvalue problem, 210  
Electromagnetic casting, 112  
Electrostatic capacitive sensor, 94  
Envelope broadening, 128

## F

Faults, 143  
Fingering patterns, 185  
Finite element approximation, 105  
Finite element method, 119  
Finite element model, 212  
Flory-Huggins model, 202  
Fourier–Bessel series, 171  
Fréchet derivative, 88  
Free boundary problem, 112  
Free traction condition, 37  
FreeFem++, 119  
Friction law, 143  
Frictional condition, 37

## G

Gel, 4  
Generalized eigenvalue problem, 209  
Generalized J-integral, 99, 100  
Goldstein, 171, 173

Goursat-Kolosov-Muskhelishvili stress function, 37  
 Gradient flow, 15

## H

$H^1$  gradient method, 84, 88, 116  
 Hardin, 168  
 Hele-Shaw problem, 185  
 Helical variable, 171  
 Helical vortex filament, 168, 171  
 Helicoidal vortex sheet, 168, 171  
 Helmholtz problem in inhomogeneous medium, 53  
 Hydrodynamic flow, 205  
 Hydrogen embrittlement, 28  
 Hyphae, 175

## I

Identification of the center of inhomogeneities, 79  
 Inverse Helmholtz problem in inhomogeneous medium, 69  
 Inverse source problem, 153  
 Iterative thresholding algorithm, 153

## J

$J$ -integral, 99

## K

Kármán, 173  
 Karush–Kuhn–Tucker conditions, 89  
 Kawada, 167, 169, 173  
 K computer, 207

## L

*Lamé* constants, 36  
 Laplacian equation, 171  
 Linear disturbance problem, 94  
 Linear elastic system, 101  
 Link mechanism, 91  
 Localization method, 106

## M

Markov approximation, 127, 131  
 Mean compliance, 87, 104  
 Message Passing Interface (MPI), 211  
 Microphase-separated structure, 197  
 Mode coupling equation, 190

Moriya, 168, 173  
 MS envelope, 134  
 MUMPS, 211  
 Mushroom-shape, 3

## N

Navier's equation, 36  
 Non-penetration condition, 37  
 Non-solvent induced phase separation (NIPS), 202  
 Nonparametric shape optimization problems, 84

## O

Optimal shape design, 111  
 Order of singularity, 39

## P

Phase field, 27  
 Poiseuille flow, 94  
 Potential, 171  
 Primal problem, 115  
 Propeller wake, 168  
 Pseudo-spectral method, 204

## Q

Quadrature surface, 112

## R

Random media, 129  
 Regular, 101  
 Rigid displacements, 37  
 Rigidity condition, 38  
 Rigid line inclusion, 38  
 Rupture velocity, 143

## S

Sakurai–Sugiura method, 208  
 Scattering coefficient, 130  
 Self-adjoint relation, 87  
 Self-consistent field (SCF) theory, 198  
 Sequential quadratic approximation problem, 89  
 Shape derivative, 84, 113  
 Shape optimization, 111  
 Shape optimization problem, 83, 104  
 Shape sensitivity analysis, 111  
 Shell structure, 93

Spinodal decomposition, [205](#)  
Steady tip growth, [176](#)  
Stokes equation, [203](#)  
Stress intensity factors, [39](#)  
Synchronization, [219](#)

**T**

The Kuramoto–Sakaguchi equation, [220](#)  
Thermoplastic elastomers, [197](#)  
Thin viscous sheet, [176](#)  
TOP500, [208](#)  
Topological derivative, [75](#)  
Traction method, [84](#), [111](#)

Two-frequency mutual coherence function, [131](#)  
Two-parameter topological expansion, [72](#)

**V**

Vibration, [207](#)  
Volume constraint, [87](#)

**W**

Wasserstein distance, [18](#)  
Wave equation, [153](#)  
Weakly coupled limit cycle oscillators, [219](#)  
Weakly nonlinear stability analysis, [185](#)