

Index

- Abel's inversion theorem, 237
 Action-angle variables, 166
 Addition theorem, 34
 Anisotropy radius, 220
 Apocenter, 81, 87
 Augmented density, 283
 Azimuthal quantum number, 32
- β -models, 244, 270
 Basis, 297
 Beltrami field, 320
 Bertrand's theorem, 90
 Bertin–Stiavelli $f^{(v)}$ models, 226
 Bertin–Stiavelli f_∞ models, 226
 Bessel functions, 310
 Beta function, 305
 Binney's logarithmic potential, 251
 Binomial coefficients, 305
 Blow-up, 108
- Cauchy's second law, 177
 Cauchy–Schwarz inequality, 297
 Center of mass, 106
 Central configuration, 109
 Central cusp – anisotropy theorem, 290
 Centrifugal force, 300
 Centrifugal potential, 300
 Characteristic, 154
 Circulation, 315
 Circular orbit, 85
 Circularized effective radius, 250
 Circularized radius, 249
 Closed field, 317
 Co-area theorem, 22, 326
 Collinear solution, 109
 Collisional system, 126
 Collisionless Boltzmann equation, 155
 Collisionless evaporation, 58, 64
 Collisionless system, 126
- Collisions, 108
 Complex lamellar field, 320
 Complex shift, 253
 Continuity equation, 176
 Core collapse, 133
 Core radius, 240
 Coriolis' force, 300
 Cosine integral, 306
 Coulomb's logarithm, 131, 134, 138
 Cuddeford models, 222, 256
 curl, 14
 Curvilinear coordinates, 323
- Dawson functions, 306
 de Vaucouleurs profile, 242
 Deferent, 87
 Differential energy distribution, 232
 Differential form, 317
 Diffusion coefficients, 127, 128, 160
 Dipole potential, 29
 Dirac δ -function, 5, 8, 312
 Dirichlet's problem, 18
 div, 14, 316
 Dynamical friction, 137
- Effective ellipse, 250
 Effective potential, 84
 Effective radius, 239
 Einasto models, 243
 Ellipsoidal coordinates, 20
 Ellipsoidal potential, 278
 Elliptic functions, 307
 Elliptic integrals, 306
 Ensemble, 153
 Epicyclic frequencies, 86
 Epicyclic theory, 83
 Error function, 306
 Escape velocity, 196
 Euler equation, 177

- Euler's angles, 55, 197
 Euler's force, 300
 Evans' power-law models, 251
 Exact field, 315
 Exponential disk, 45, 95, 272
 Exponential integral, 306
 Extended DF, 126, 140, 189
- Faber–Jackson law, 117
 Ferrers ellipsoids, 25, 262, 277
 Finite Mestel disk, 97, 272
 Fixed singularities, 108
 Flat solution, 109
 Flow-box theorem, 163
 Flux, 315
 Fokker–Planck equation, 155, 160
 Fourier series, 32, 314
 Fourier transform, 31, 313
 Fricke models, 230
 Frobenius' theorem, 108
 Fuch's theorem, 108
 Fundamental plane, 266
- Galactic longitude, 92
 Gamma function, 304
 Gaseous polytropes, 180, 225
 Gauss theorem, 7, 10, 316
 GDSAI, 281, 290
 Gegenbauer polynomials, 310
 Generalized Cuddeford models, 223
 Geometric collision, 10
 Global collapse, 109
 grad, 314
 Gravitational evaporation, 133
 Gravitational field, 4
 Gravitational potential, 14, 15
 Gravothermal catastrophe, 114
 Green function, 30, 320
 Green identities, 18, 319
 Green theorem, 317
- Half-mass radius, 240
 Hankel closure relation, 311
 Hankel transform, 35, 44, 311
 Harmonic function, 18
 Heat conduction, 178
 Heat flux vector, 178
 Heaviside step function, 313
 Helmholtz decomposition theorem, 14, 319
 Helmholtz equation, 225
 Henon's isochrone, 245, 254, 270
 Hernquist model, 245
 Hill's surfaces, 302
 Holomorphic Coulomb field, 253
 Homeoid, 20
 Homeoidal expansion, 26, 264
 Homographic solution, 109
- Homotetic solution, 109
 Hubble–Reynolds profile, 243
 Hydrostatic equilibrium, 180
 Hypergeometric functions, 307
- Impact parameter, 79, 127
 Incompressible fluid, 176
 Inertia tensor, 41, 301
 Infrared divergence, 130
 Inner product, 296
 Innermost stable circular orbit, 99
 Integral of motion, 162
 Interaction energy tensor, 186
 Internal energy, 178
 Intracluster stellar population, 64
 Invariable plane, 107
 Involution, 157
 Irrotational field, 317
 Isophotal twisting, 249
 Isothermal sheet, 235
 Isothermal sphere, 226
 Isotropic rotators, 259
 Isotropic system, 215
- Jacobi identity, 165, 298
 Jacobi's integral, 301
 Jacobi–Lie integrability, 162
 Jaffe model, 245
 Jeans equations, 172, 174
 Jeans theorem, 161, 166
- Kelvin theorem, 331
 Kelvin time, 116
 Kinetic energy tensors, 185
 King models, 226
 King's photometric profile, 243
 King's sphere, 65, 244, 270
 Kormendy law, 118
 Kuzmin disk, 251, 255, 272
 Kuzmin's theorem, 252
- Lagrange libration points, 302
 Lagrange–Jacobi identity, 107, 120
 Lamé coefficients, 167, 323
 Lane–Emden equation, 225
 Laplace equation, 18
 Laplace theorem, 110
 Laplace–Runge–Lenz vector, 78, 79
 Laplacian, 17, 30, 318
 Legendre associate functions, 32, 308
 Legendre functions, 308
 Legendre integral transform, 43
 Legendre polynomials, 34, 308
 Levi–Civita tensor, 299
 Libration, 56
 Lie algebra, 165, 276
 Lie–Jacobi integrability, 78

- Line of sight, 197
 Line profile, 203
 Liouville equation, 153
 Liouville theorem, 153, 157, 158, 332
 Logarithmic density slope, 290
 Logarithmic integral, 306
Los projected streaming velocity field, 201
Los projected velocity dispersion field of order N , 201
Los projected velocity field of order N , 200
Los velocity dispersion field of order N , 201
- Maclaurin disk, 97, 272
 Macroscopic function, 151, 153, 154, 173
 Macrostate, 151
 Master equation, 160
 Material derivative, 175, 330
 Maxwell–Boltzmann, 133
 Maxwell–Boltzmann distribution, 135
 Mean free path, 10
 Merging of galaxies, 117
 Meridional plane, 84
 Mestel disk, 46, 95, 96, 272
 Method of moments, 172
 Michie models, 226
 Microscopic function, 173
 Microstate, 151
 Mixed product, 299
 Miyamoto–Nagai model, 250, 255, 261, 272
 Modified Bessel functions, 45, 311
 MOND, 47
 Monopole potential, 29
 Movable singularities, 108
 Multipole expansion, 28
- Navarro–Frenk–White profile, 245, 270
 Neumann’s problem, 18
 Newton’s first theorem, 5
 Newton’s second theorem, 5
 Newton’s third theorem, 20
 Newtonian fluids, 177
 Noether’s theorem, 78, 166
 Norm, 296
- Oort’s constants, 90, 93
 Orbital eccentricity, 79
 Orbital family, 84
 Orbital precession, 88, 101
 Osipkov–Merritt models, 220, 256
 Ostriker–Peebles stability criterion, 114, 280
- p -Laplacian, 47
 Perfect ellipsoid, 41, 65, 244, 270
 Pericenter, 81, 87
 Phase mixing, 114
 Phase-space distribution function, 125
 Phase-space velocity dispersion field of order N , 201
- Phase-space velocity field of order N , 200
 Planar solution, 109
 Plummer model, 225, 244, 254, 270, 274, 294
 Poisson bracket, 157, 165
 Poisson equation, 17, 217
 Polylogarithm, 306
 Polytropic index, 225
 Power-law models, 243, 257
 Projected luminosity, 239
 Projected mass, 239
 Projected mass density, 238
 Projected streaming velocity field, 200
 Projected velocity dispersion field of order N , 201
 Projected velocity field of order N , 200
 Projected virial theorem, 205
 Proper motion, 94
 Pseudo-collisions, 108
- Quadrupole potential, 29
 Quadrupole tensor, 29, 41
 Quasi-isothermal sphere, 244
- $r^{-\alpha}$ force, 11, 48, 82, 120, 192
 γ -models, 40, 65, 245, 270
 Radial migration, 77
 Radial orbit instability, 114, 269, 280
 Rayleigh criterion, 87
 Reciprocity theorem, 188
 Rectilinear solution, 109
 Reduced mass, 72, 127
 Relative energy, 212
 Relative equilibrium, 109
 Relative orbit, 71
 Relative potential, 212
 Relative velocity, 71
 Reynolds’ transport theorem, 176, 328
 Riesz potential, 48, 135
 Roche limit, 68
 Roche potential, 302
 Rodrigues identity, 308
 Rosenbluth potential, 131, 136
 rot, 14
 Rotation curve, 94
- Satoh decomposition, 260
 Satoh models, 250
 Scaling laws, 117
 Second quantum number, 32
 Semilatus rectum, 79
 Separation of variables, 31
 Sersic profile, 241, 271
 Shear tensor, 177
 Sine integral, 306
 Singular isothermal ellipsoid, 193
 Singular isothermal sphere, 36, 90, 99, 233, 243, 275

- Slingshot effect, 70, 74
- Solenoidal field, 317
- Spherical harmonics, 32
- Spiral structure, 90
- Stäckel models, 25, 251
- Stellar polytropes, 224
- Stirling expansion, 304
- Stokes' theorem, 14, 316
- Streaming velocity, 173
- Stress tensor, 177
- Strip brightness, 239, 241
- Strong homology, 268
- Struve functions, 47
- Sturm–Liouville theorem, 309
- Sundman's inequality, 107, 121
- Superposition principle, 4
- Surface brightness profile, 238
- Szygial solution, 109

- Tensor virial theorem, 185
- Tidal disruption, 68
- Tidal field, 49
- Tidal potential, 50
- Tidal tensor, 50
- Tidal torque, 55
- Toomre stability criterion, 114, 280
- True anomaly, 79
- Truncated constant-density disk, 97, 272
- Truncation radius, 238

- Tully–Fisher, 86
- Two-body relaxation time, 126

- Ultraviolet divergence, 130
- Unicity theorem, 18, 21

- Vector product, 297
- Velocity dispersion ellipsoid, 173
- Velocity dispersion tensor, 173
- Velocity moments, 173
- Velocity profile, 203
- Velocity section, 213
- Versor, 297
- Violent relaxation, 113
- Virial plane, 114
- Virial radius, 112
- Virial theorem, 111
- Virial velocity dispersion, 112
- Vlasov equation, 155

- Wave vector, 313
- Weak homology, 268
- Weierstrass–Sundman theorem, 109, 122
- Wilson models, 226
- Wronskian, 309

- Yukawa potential, 99

- Zero-velocity curve, 85, 87