

Index

- accretion disk, 29, 161
- Alfvén H., 4, 21
- Alfvén speed, 54, 100, 161, 205
- Alfvén wave, 21, 52, 54, 56, 141, 142, 207
- Alfvén wave turbulence, 195, 207, 213, 215, 232
- Alfvén wave-packet, 205, 215, 233
- Alfvén whistler wave, 60
- Alfvén’s theorem, 39, 41, 96, 99
- alpha effect, 84
- Ampère’s theorem, 152
- anisotropy, 212, 216, 231
- anomalous dissipation, 185
- anti-dynamo theorem, 78
- astrophysical plasma, 7
- autocorrelation, 179
- Bessel functions, 79, 81, 156
- Biot–Savart law, 20
- black hole, 161
- Boltzmann L., 8, 12
- bow shock, 86, 94
- butterfly effect, 175
- chaos, 174
- closure, 195, 232, 236
- cluster, 93
- CNES, 4
- collective effects, 14
- collisional, collisionless plasma, 9, 99
- collisionless reconnection, 103
- collisionless shock, 95
- conductivity, 23, 28
- conservative system, 130
- contact discontinuity, 91, 92
- Coriolis force, 164
- correlation length, 179
- correlation time, 179
- critical balance, 213
- cross-helicity, 47
- cross-helicity conservation, 36
- cumulant, 180
- current sheet, 97, 231
- Debye length, 15, 88
- degree of ionization, 7
- diffusion speed, 100
- discontinuity, 86
- displacement current, 23
- dynamic viscosity, 24
- dynamo, 65
- eddy, 177
- electric conductivity, 18
- electric current, 23
- electric resistivity, 25
- electric screening, 15
- electromagnetic induction, 19
- electromagnetic power, 35, 101
- electron MHD, 28, 220
- Elsässer variables, 203, 233
- energy cascade, 177, 185, 195, 222
- energy conservation, 34
- energy spectrum, 192, 193, 224
- ensemble average, 177
- epicyclic frequency, 166
- ESA, 4
- flux, 32, 36, 37
- Fokker–Planck, 8
- force-free equilibrium, 123
- fractal, 222

- fractal dimension, 224
- fractal law, 226
- galaxy, 72, 163
- generalized helicity, 45, 48
- generalized vorticity, 45
- generalized vorticity topology, 46
- geodynamo, 71
- Grad–Shafranov equation, 78, 121
- gravitational tide, 165
- gravity wave, 146
- growth rate, 127, 167
- gyro-radius, 16
- Hall effect, 24, 26, 28, 37, 42, 45, 46, 58, 61, 103, 197, 209, 219
- Hartmann layer, 108
- Hartmann number, 108
- helical wave, 58
- helicon wave, 58
- hermitian, 137
- homogeneity, 181, 182, 192, 202, 236
- ideal, 28, 36
- industrial plasma, 7
- inertial length, 16, 24–26, 104, 197
- inertial range, 186, 188, 195, 197, 203, 205
- integral scale, 179
- intermediate shock, 94
- intermittency, 190, 195, 207, 221, 222
- internal energy, 34, 35
- interstellar medium, 199
- invariant, 36, 37, 39
- inverse cascade, 209
- inviscid, 29, 36
- ion-cyclotron Alfvén wave, 60, 63
- ion-cyclotron frequency, 60
- ionosphere, 3
- Iroshnikov–Kraichnan spectrum, 207
- isotropy, 181, 188, 193, 203, 219
- isotropy, strong, 181
- ITER, 6, 30, 119
- jump conditions, 88
- Jupiter, 216
- Kelvin’s theorem, 40
- Keplerian velocity, 162
- kinematic dynamo, 74, 79, 84
- kinematic viscosity, 27
- kinetic Alfvén wave, 63
- kinetic energy, 35
- kinetic equation, 8, 10
- kinetic helicity, 47
- Kolmogorov A. N., 173, 181, 182, 222
- Kolmogorov law, 182, 188, 190, 203
- Kolmogorov spectrum, 195
- Kruskal–Schwarzschild instability, 146
- Lagrangian displacement, 134
- Landau L. D., 5, 11, 63
- Langmuir I., 3
- Langmuir wave, 14
- Laplace force, 20
- Larmor radius, 88
- Lenz’s law, 19
- linear force-free field, 123
- liquid metal, 19, 27, 30, 108
- log-normal law, 228
- log-Poisson law, 229, 231
- Lorentz force, 19
- Lorenz system, 175
- Lundquist number, 100
- magnetic confinement, 114, 116
- magnetic diffusivity, 25
- magnetic energy, 35
- magnetic flux, 40, 41
- magnetic helicity, 42, 209
- magnetic helicity conservation, 38
- magnetic pressure, 52
- magnetic reconnection, 93, 96
- magnetic Reynolds number, 19, 28, 73
- magnetic screening, 16
- magnetic substorm, 96
- magnetic surface, 114, 118
- magnetic tension, 52
- magnetic topology, 39, 44
- magneto-rotational instability, 161
- magnetohydrodynamics, 4, 18, 19
- magnetopause, 86, 92
- magnetosheath, 86
- magnetosonic wave, 56, 63, 142
- magnetosphere, 4, 29, 70, 86, 177
- magnetostrophic wave, 68
- mass conservation, 32
- Maxwell J. C., 3, 12, 21
- mean rate of dissipation ε , 184
- mirror symmetry, 181
- MMS, 106
- modes g, p, 107
- moment, 180
- momentum conservation, 33
- MRX, 96, 102, 104
- multi-fluid equations, 17

- NASA, 4
- neutral layer, 99
- non-linear force-free field, 123
- normal modes, 138
- Ohm’s law, 18, 24
- paleomagnetism, 70
- Parker E., 4
- phenomenology, 189, 194, 205, 210, 212, 224
- pinch, θ , 114
- pinch, z , 116, 152
- pinch, z – θ , 160
- pinch, Bennett, 117
- planetary magnetic fields, 30
- plasma, 3, 8
- plasma angular frequency, 14
- plasma thruster, 6
- polarization, 58
- polytropic, 18, 26, 34, 55, 133
- Ponomarenko Y. B., 67, 79, 82
- potential energy, 129, 131, 133
- potential field, 123
- Poynting vector, 35
- pressure, 28
- probability density function, 180
- pseudo-Laplacian, 78, 120
- quasi-neutrality, 24
- Rankine–Hugoniot equations, 90, 94
- Rayleigh–Taylor instability, 128, 143
- reconnection rate, 101, 104
- reconnection time, 102
- reconnection, Sweet–Parker, 99
- reduced MHD, 47
- resonance, 61
- resonance condition, 234
- Reynolds number, 28, 177
- Rossby number, 68
- rotational discontinuity, 91–93
- Sakharov A., 5
- Saturn, 97
- scale-invariance, 182
- SDO, 4
- self-similarity, 190, 222
- shock, 92
- small-displacement operator, 135
- SoHO, 4, 106
- solar corona, 29, 54, 151, 216
- solar flare, 96, 199
- Solar Orbiter, 4
- solar wind, 4, 29, 54, 125, 196, 214, 219
- Soloviev equilibrium, 121
- sonic wave, 63, 142
- sound speed, 26, 56
- source, 36–38
- space weather, 199
- space-charge, 13
- spatio-temporal memory, 179, 192
- spectral tensor, 193, 236
- stability criterion, 136
- stable equilibrium, 125
- stationarity, 181, 187, 203
- stream function, 118
- structure function, 181, 184, 190, 202, 224
- Sun, 29, 44, 72, 75, 86, 151, 198, 212
- sunspot, 72
- superfluid helium, 96
- tangential discontinuity, 91, 92
- tearing instability, 168
- thermal speed, 15, 115
- thermodynamic equilibrium, 8
- thermonuclear fusion, 4, 30, 113
- thermonuclear plasma, 8, 115, 152
- tokamak, 30, 48, 78, 113, 117, 126, 201
- triadic interactions, 233
- turbulence, 162, 173
- turbulent diffusion, 241
- turbulent dynamo, 85
- turbulent reconnection, 104
- universal law, 187
- unpredictability, 175
- viscosity stress, Reynolds, Maxwell tensor, 33
- Vlasov A. A., 5, 8, 11
- von Kármán–Howarth equation, 184
- vorticity, 34
- whistler turbulence, 242
- whistler wave, 60
- X-point, 101, 109, 250