

Index

- 0° configuration, 267
- 45° configuration, 267, 268
- μMAG, 110
- 2-T model, 275, 276
- 2PPE, 272, 273, 291
- 3-T model, 279, 289
- 3 d transition metals, 257

- absorption of light, 259, 274
- activation volume, 158
- all-optical FMR, 305
- angle-resolved photoemission, 280
- angular momentum, conservation of, 281, 294
- angular momentum, exchange between orbital and spin, 282
- angular momentum, phonons, 281, 309
- anisotropy, 215, 222, 223, 231, 239
- anisotropy field, 214, 222, 223, 227
- astroid, 66, 72
- Auston switches, 217

- balanced photodiodes, 265, 292
- ballistic switching, 64, 68, 69, 78
- band gaps, 200
- band structure, transition metals, 261
- biased excitation, 232
- bleaching, 277, 283
- Bloch equation, 238
- blocking temperature, 303
- boundary-element method, 10
- Brillouin light scattering, 32, 49, 59
- Brillouin zone, 259, 260

- carrier lifetime, 217
- charge dynamics, 274
- chirp, 298
- circularly polarized light, 258, 271, 274

- Co-fcc, 15
- Co-hcp, 12
- cobalt, MO response, 259
- cobalt, spin-dependent lifetime, 291
- CoCrPt, 19
- coherent artifacts, 284
- coherent control, 303
- coherent magneto-optics, 284
- coherent phonons, 278, 282
- coherent spin waves, 305
- compensation temperature, 236, 239
- conservation of angular momentum, 281, 294
- coplanar waveguide, 217
- copper, Cu/Ni/Cu, 294
- CoPt₃, circularly polarized excitation, 257, 292
- CoPt₃, laser-induced demagnetization, 291
- CoPt, laser-induced demagnetization, 302
- Coulomb interaction, 275
- crossed-polarizer configuration, 262, 264, 265, 289

- damping parameter, 102
- decay time, 217, 222
- degenerate spin-wave modes, 38, 42, 44
- delay line, 262
- demagnetization, 254, 279
- demagnetizing field, 205, 216, 228
- demagnetizing tensor, 103
- dephasing, 293
- dichroic absorption, 259
- dichroic bleaching, 283, 298, 307
- dielectric function, model, 261
- diffusion, 298, 308
- diluted magnetic semiconductors, 274

- dipolar interaction, 41
- direct band gap, 257
- discrete media, 18
- domain wall, 157
- domain-wall motion, 118, 213
- domain-wall trap, 119
- double-modulation scheme, 269, 270, 295
- Drude dielectric function, 261
- dynamic coercivity, 12, 15, 19

- e–e scattering, 275
- e–p scattering, 275, 277, 309
- effective field, 216, 222, 223, 227, 238, 287, 303
- elastic exchange scattering, 195
- electric dipole approximation, 259, 271
- electro-optic sampling, 217
- electron bunch, 256
- electron dynamics, 265, 274
- electron thermalization, 277
- electron–electron scattering, 275
- electron–phonon interaction, 288
- electron–phonon relaxation, 302
- electron–phonon scattering, 275, 277
- electronic structure, 259
- Elliot–Yafet theory, 309
- ellipsometry ratio, 268
- ellipsometry, transient, 266
- ellipticity, 261
- ellipticity, transient, 264
- exchange anisotropy, 286
- exchange biasing, 287
- exchange biasing, optical modulation, 303
- exchange coupling, 244
- exchange energy, 187
- exchange field, 203
- exchange split bands, 260
- exchange splitting, temperature dependence, 280
- exchange-bias system, 50
- excitation modes, 255

- Faraday effect, 261
- fast Fourier transformation, 84
- femtosecond magnetization dynamics, 254, 279, 287, 305
- Fermi level, 260
- Fermi–Dirac distribution, 259, 275
- ferrimagnetic, 235
- ferromagnetic resonance, 31, 44, 49, 59, 127
- finite-element method, 10
- FMR, 305
- four-wave mixing, 258, 284
- Fresnel coefficients, 262, 287
 - temperature dependence, 280
 - transient, 295, 299

- g* factor, 281
- GaAs, 217
- gadolinium, laser-induced demagnetization, 288
- gadolinium, spin–lattice relaxation, 288
- GHz magnetization dynamics, 255, 286, 287, 303, 304, 307
- giant magnetoresistance, 186, 274
- Gilbert damping constant, 29, 35, 46, 256
- Gilbert damping term, 102
- Gilbert equation, 3
- group velocity, 83, 85
- gyromagnetic precession, 5

- half-metallic ferromagnet, 292
- high-bandwidth magnetoresistance measurement, 120
- high-speed switching, 5, 131
- hot electrons, 257, 273, 274, 306
 - lifetime, 275

- induced MO response, 278
- inelastic mean free path, 192
- instantaneous demagnetization, 292, 294
- instantaneous magneto-optics, 296, 305
- intensity of electromagnetic wave, 264
- interband transitions, 260
- interfacial anisotropy, 41, 44
- interfacial defects, 44
- interfacial magnetism, 272, 308
- iron garnet, 37, 77
- iron, laser-induced demagnetization, 288, 300
- iron, MO response, 259
- iron, spin-dependent lifetime, 291
- isotropic materials, 262

- jitter, 225, 231, 233
- Jones matrix, 264, 266
- Kramers–Kronig relation, 300
- Landau–Lifshitz equation, 29, 34, 40, 60, 61, 101
- Landau–Lifshitz–Gilbert, 215
- Landau–Lifshitz–Gilbert equation, 4, 256, 287, 304
- Langevin equation, 21
- Larmor frequency, 256
- Larmor precession, 203
- laser excitation, 214
- laser heating, 254, 256, 257, 278, 287
- laser-induced demagnetization, 254, 279, 280, 285, 287, 297, 305
- laser-induced precession, 286, 304, 307
- lattice expansion, 285
- lifetime, hot electrons, 273, 275
- lifetime, spin-dependent, 291
- line width, 31, 36, 42, 49
- LLG equation, 216, 256, 287, 304
- lock-in amplifier, 269
- longitudinal Kerr effect, 262
- Lorentzian, 299
- magnetic anisotropy, 61, 286, 295
- magnetic anisotropy, temperature dependence, 287, 304
- magnetic damping, 61, 69
- magnetic disorder, 140
- magnetic field pulse, 213, 214, 247, 256
- magnetic moment, 281
- magnetic noise, 143
- magnetic pump, 257
- magnetic recording, 18, 233
- magnetic scalar potential, 10
- magnetic speckle, 161
- magnetic tunnel junction, 95
- magnetization dynamics, 213, 215, 216, 234, 238, 240, 245, 246
- magnetization modulation, 270
- magnetization reversal, 214, 223, 233, 234, 238, 244
- magnetization reversal mode, 17, 63
- magnetization, transient, 263
- magnetization-induced optical second-harmonic generation, 220, 271
- magneto-optical artifacts, 298, 300, 308
- magneto-optical Faraday effect, 261
- magneto-optical Kerr effect, 191, 261
- magneto-optical response, 86, 261
- magneto-optical spectrum, nickel, 260
- magneto-optical spectrum, transition metals, 260
- magneto-optics, 188, 259
- magneto-crystalline anisotropy, 9, 286
- magneto-electronics, 254
- magnetostatic approximation, 29
- magnetostatic surface wave, 86
- magnons, 280
- MAMMOS, 234
- metastable state, 133
- microcoil, 166
- micromagnetic modeling, 109
- micromagnetics, 1, 9
- microstructure, 9
- MOKE, 219–221, 226, 261
- momentum operator, 259
- MO recording, 309
- MRAM, 9, 98, 231–233, 247, 248
- MSHG, 220, 226, 271, 289, 294
- MTJ, 231
- Néel coupling, 100
- nano-element, 10
- nickel, laser-induced demagnetization, 254, 288–291, 296, 297, 301, 302
- nickel, laser-induced demagnetization, theory, 293
- nickel, laser-induced precession, 304, 305
- nickel, MO response, 259, 260
- nickel, spin-dependent lifetime, 291
- nickel, transient magneto-optics, 294, 296, 298
- NiFe, laser-induced precession, 303
- NiO, laser-induced precession, 303
- noble metals, 275, 276
- nonlinear susceptibility, 258
- nonthermal electron distribution, 276, 280
- nucleation, 17, 157
- nucleation site, 244
- OOMMF, 110
- optical activity, 258

- optical excitation, 214, 236
- optical matrix element, 259
- optical susceptibility, 258
- orange-peel coupling, 72, 100
- orbital momentum, 259, 281
- orbital momentum, quenching of, 257
- orientational phase transition, 294

- p-polarized light, 264
- parallel steps, 47
- paramagnetic materials, 257
- PEEM, 179
- PEM, 266
- Permalloy, 49, 215, 219, 221
- perpendicular anisotropy, 19
- perturbation schemes, 255, 257
- phase space arguments, 258, 275, 277
- phonon emission, 275, 277
- phonons, 257, 278
- photoconductive switch, 213, 224, 256
- photoelastic modulator, 266
- photoemission, 246, 272, 288, 291
- photoemission, angle-resolved, 280
- photoluminescence, 274
- photoquenching of demagnetization, 307
- photoswitch, 218, 224, 227
- plane of incidence, 262
- polar Kerr effect, 262
- polarization, 258
- polarization modulation, 266
- polarization, MO rotation, 261
- polarizer, 264
- polyvalent device, 73
- precession, 213–215, 219, 221–223, 227, 228, 256
- precession, laser-induced, 286
- precessional magnetization reversal, 205
- precessional reversal, 215
- precessional switching, 64, 65, 73, 213–216, 247
- probe beam, 219, 220
- propagating spin-wave mode, 84
- pseudospin valve, 99
- pump beam, 218–220, 225, 226, 239
- pump-probe, 160
- pump-probe experiments, 195

- pump-pump probe, 224, 225

- quadrupole contributions, 272
- quantum well, 257
- quarter-wave plate, 265
- quenching of orbital momentum, 257, 259, 282
- quenching pulse, 226–228

- rare-earth doping, 147
- reflection coefficients, 264
- relaxation dominated switching, 63, 65
- residual line width, 35
- reversal dynamics, 242, 243, 245–247
- reversal time, 223, 234, 237, 243, 244, 248
- ringing, 228, 229, 231–233
- ringing suppression, 78, 80
- rise time, 217, 222, 233, 247
- rotation by magnetization, 281, 282
- rotation of polarization, 261
- rotation versus ellipticity, 266, 281, 287, 294, 295, 299–301, 307
- rotation, transient, 264
- Runge–Kutta algorithm, 62
- Russek, 216, 231, 233

- s-polarized light, 264
- saturation magnetization, 222, 247
- second-harmonic generation, 258, 271
- self-supported layers, 192
- shape anisotropy, 286
- SHG, 258, 271, 289, 294
- shock wave, 278
- short field pulses, 214
- silver, nickel on, 291
- single-domain model, 101
- skin depth, 32, 35
- specific heat, 275
- spectroscopic splitting factor, 215
- spin imbalance, 271
- spin momentum, 281
- spin motion, 187
- spin polarization, 274
- spin relaxation time, 274
- spin temperature, 279, 285, 289, 301
- spin valve, 95, 156, 159
- spin wave, 256
- spin wave model, 280, 295
- spin-dependent lifetime, 273

- spin–electron coupling, 289
- spin–flip scattering, 280, 309
- spin–lattice relaxation, 213, 238, 254, 282, 288, 291, 306
- spin–orbit coupling, 257, 259, 288, 293
- spin–selective excitation, 256, 257, 271
- spin-dependent absorption coefficients, 197
- spin-dependent electron absorption, 186
- spin-dependent scattering, 186
- spin-lattice relaxation time, 207
- spin-polarized scanning electron microscope, 206
- spin-wave, 247, 248
- spin-wave dispersion, 41
- spin-wave propagation, 82
- spintronics, 254
- SQUID, 274
- Sr_2FeMo_6 , laser-induced demagnetization, 292
- standard micromagnetic problem, 111
- Stanford Linear Accelerator Center, 206
- state filling, 277, 298
- Stoner excitations, 236, 291
- Stoner model, 60, 280, 281
- Stoner–like shift of bands, 280
- Stoner–Wohlfarth model, 101
- strain, MO effects, 285, 300
- strip line, 166, 256
- submicron-sized magnet, 1
- surface anisotropy, 41, 44, 49
- surface defects, 44
- surface magnetism, 272
- susceptibility, optical, 258
- switching diagram, 66, 67, 70
- synchrotron, 155, 159
- synthetic antiferromagnet, 97

- temperature, definitions of, 275
- thermal difference scheme, 301, 302, 308
- thermal fluctuation, 21
- thermalization, 275
- thermally activated, 157
- thermomagnetic writing, 213, 215, 235, 238, 245–247
- thin-film element, 10
- three-temperature model, 279, 289
- Ti:sapphire laser, 260

- time-resolved Kerr magnetometer, 75
- time-resolved magnetization modulation spectroscopy, 271
- time-resolved magnetometry, 274
- time-resolved MOKE, 261, 264
- time-resolved MSHG, 272, 289, 294
- time-resolved photoemission, 272, 288, 291
- time-reversal, 258
- TIMMS, 271
- TR-MOKE, 76
- TR-MSHG, 272
- transient electron temperature, 237, 242
- transient ellipsometry, 266, 268, 277, 302
- transient magnetization, 263, 273
- transient magneto-optics, 261, 278, 283, 296
- transient optics, 262
- transient reflection, 265, 268, 277, 278
- transient reflection, lattice contribution, 278
- transient transmission, 277, 289
- transition metal, 235, 257, 259, 260
- transition metal, band structure, 261
- transverse Kerr effect, 262
- TRMOKE, 261, 262, 264, 270, 271, 289
- TRPE, 272, 288, 291
- tunnel junction, 156, 159
- tunnel magnetoresistance, 274
- two-magnon scattering, 36, 42, 44
- two-photon photoemission, 272, 273, 291
- two-temperature model, 275, 276

- ultrafast magnetization dynamics, 254, 279, 287, 305
- uniform precession, 30, 37
- uniform precession mode, 84
- uniform rotation, 17

- waveguide, 217–219, 221, 224, 247
- weak-perturbation limit, 263, 267, 270
- wedge, 295, 302

- XMCD, 159, 162, 165

- Zeeman energy, 286
- zero-field line width, 35
- zone edge phonons, 277