

## Index

### a

- absorption 17, 21–23, 42, 113–118, 120–126, 128, 130, 132, 144, 156, 157, 167–171, 264, 346, 382
- achiral dopant 324
- acoustic chamber 111, 112, 115, 116, 119, 137, 156
- acoustic field, visualizing 2, 405–412
- acoustic flow 406, 407, 413
- acoustical impedance 138
- acoustooptical effects 67, 379, 406, 408, 412
- active addressing 317
- active matrix (AM) 3, 8, 9, 283, 345, 346, 350, 351
  - LCD 9, 346, 350, 352–355
- addressing 16, 34, 301, 302, 305, 306, 308, 310, 314, 317, 322, 337, 340–343, 346–349, 351–353, 358
  - scheme 308, 317, 322, 342, 343, 346, 358
  - technique 317, 347
- alignment
  - on curved and flexible substrates 34, 369
  - on the surface 30–40
  - preferred direction 31, 35
- Alt-Pleshko scheme 317
- anchoring
  - boundary condition 285, 288
  - energy 4, 31, 32, 34, 39–41, 101, 103, 252–255, 261, 263, 287, 296, 323, 324, 328–331, 336, 348, 355, 357, 358, 369
  - potential 40, 254, 309
  - strong 33, 39, 97, 99, 100, 103, 186, 252, 253, 255, 256, 258–260, 266, 271–273, 285, 288
  - weak 2, 7, 95, 97–101, 103–105, 186, 253, 254, 256, 257, 263, 265, 269, 271, 285, 287, 330
  - zenithal 255
- angle
  - azimuthal 52, 57, 62, 65, 82, 84, 87, 182, 185, 200, 204, 211, 214, 297, 303
  - deviation 40, 287
  - flow alignment 139, 222, 224–227
  - high pretilt 36, 39, 261, 262, 295
  - incidence 303–305, 312, 364
  - maximum director 289
  - optimized 307
  - polar 55, 57, 60, 74, 82, 100, 104, 105, 181, 206, 234, 250, 254, 303, 356
  - pretilt 13, 32, 34, 36, 37, 39, 68, 261–263, 292, 293, 295, 296, 299, 301, 303, 314, 315, 348, 350, 356
  - rotation 37, 183, 196, 199, 201, 202, 259, 299
  - supertwist 313–315
  - switching 356, 357
  - tilt 36, 207, 214, 215, 286, 297, 320, 323–328, 333, 341
  - twist 38, 182, 183, 257, 302, 313–315, 348, 349, 356, 357, 359
  - viewing 303, 305, 309, 310, 314, 316, 317, 321, 322, 350, 351, 355, 356
  - wide viewing 316, 321
- anisotropic propagation 111, 121
- anisotropic shear viscosities 179, 218, 221, 222, 227, 229, 232, 233, 238, 239
- anisotropy
  - diamagnetic 41, 184, 218, 290
  - dielectric 14–16, 18–21, 41, 262, 284, 285, 290, 293, 295, 296, 301, 302, 308–310, 315, 319, 321, 324, 326, 327, 333, 334, 354
  - of physical properties 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29
  - of transmission 304
  - of ultrasonic parameters 126

- optical 3, 7, 15, 21, 23, 24, 29, 283, 300, 303, 319, 324, 328, 349
- antiferroelectric liquid crystals (AFLCs) 39
- asymmetric boundary condition 204, 205, 332
- attenuation 112, 113, 115, 117, 119, 121, 125, 126, 144–147, 149–154, 156, 162, 163, 167, 170, 360, 366, 406
- attenuation coefficient 125, 145, 146, 149, 150
- ultrasonic 145
- azimuthal angle 52, 57, 62, 65, 82, 84, 87, 182, 185, 200, 204, 211, 214, 297, 303
- azimuthal gliding 266, 267, 271

**b**

- B-effect 83, 204, 284, 288, 290, 292, 293
- backflow effect 28, 46, 200, 206, 210, 218, 287, 289, 357
- backlighting system 293
- band gap 367
- bend distortion 182
- biaxiality 291, 327–329, 333
- birefringence
  - effective 340, 342
  - electrically controlled 283, 284, 289, 291, 339, 364
  - high 372
  - negative 316
  - value 328, 342
- bistability 207, 208, 334, 336, 344, 358
  - and hysteresis 309
  - in Clark-Lagerwall FLC cell 333
  - in nematic LC 309, 356
- bookshelf 213, 330, 337
  - geometry 207–209, 214, 330, 333
  - structure 209, 210, 212
- boundary condition 2, 30, 33, 41, 49, 51, 52, 67, 97–99, 101, 167, 182, 195, 203–205, 241, 249, 265, 285, 288, 309, 330, 332, 333, 338, 384
  - asymmetric 204, 205, 332
  - hybrid 100
- Bragg reflection 321, 367
- brightness 269, 307, 314, 315, 348, 353
- BTN 356, 357, 363
- bulk viscosity 1, 114, 122, 123, 144–146, 151, 154, 163, 165, 168, 266

**c**

- capacity method 262, 272
- chevron structure 209, 211, 330
- chirality 13, 16, 25, 41, 212
- cholesteric display 332, 347

- cladding refractive index 370
- Clark-Lagerwall effect 209, 333–336, 342
- Clausius-Mosotti equation 17
- clearing point 9, 15, 129, 132, 133, 139, 143–145, 147, 149, 171, 219, 222, 239, 240, 264
- coherence length 136, 196, 198, 204, 206, 222, 228, 264, 267
- color 11, 37, 292–294, 304, 309–311, 316, 322, 344–348, 360
- color coordinates 293
- color sequential FLC 346
- color sequential LCD 347, 348
- coloration 304, 309
- column addressing 317
- complex order parameter 142
- conductance 351
- confined system 3, 172
- conoscopic image 182, 186, 201, 218, 244
- conoscopic observation 182, 204
- control electrode 346
- Couette flow 46, 50–52, 54, 66, 67, 70, 95, 104–106, 230, 380
- coupling agent 34, 35
- critical dynamics 3, 111, 144, 155, 167, 172
- critical phenomena 51, 52, 132, 142, 143, 156, 168, 170, 172
- crystal fiber 369
- curve
  - reflection-voltage (RVC) 348
  - transmission-voltage (TVC) 287, 300–302, 304, 308, 309, 314–317, 341, 348, 349, 351
- curved surface 369

**d**

- 3D 34, 367, 369, 370
- 3D surface 369
- Debye
  - hypothesis 17
  - phenomenological equations 18
- decay flow 58, 60, 64–66, 74, 81, 84, 91, 93, 94, 233–235, 237
- defects 39, 57, 90, 91, 93, 131, 249, 290, 292, 309, 330, 331, 344, 345, 369
- deformed helix 328, 338, 340, 362, 363
- deformed helix ferroelectric effect 338, 362
- deviation angle 40, 287
- DHF mode 340, 341
- diamagnetic anisotropy 41, 184, 218, 290
- dielectric
  - anisotropy 14–16, 18–21, 41, 262, 284, 285, 290, 293, 295, 296, 301, 302, 308–310, 315, 319, 321, 324, 326, 327, 333, 334, 354
  - biaxiality 327, 328

- constant 18–20, 36, 186, 191, 200, 201, 215, 328, 336, 355
- regime 210, 211, 387
- diffraction grating 372
- distortion 24, 25, 48, 52, 55, 57, 60, 70, 76, 77, 87, 98, 106, 130, 131, 142, 143, 180–182, 185, 186, 191, 198, 207, 215, 218, 222, 242, 249, 253, 254, 259, 261, 285, 317, 320, 328, 342, 382, 388, 389
- bend 25, 180, 182, 218, 253
- splay 25, 180, 182, 188, 218, 253
- twist 25, 180, 191
- domain
  - ferroelectric 337, 338
  - formation 343
  - long-living 93, 94
  - mono 10, 143, 159, 180, 185, 209, 222, 239, 249, 290
  - multi 34, 201, 309, 321
  - nano 36, 295, 296
  - parasitic 313, 315
- dopant 13, 16, 38, 294, 309, 324, 326, 349, 357, 360
- double addressing 310
- double-layered twisted device 310
- driving field 333, 334, 345
- DSTN 316
- dual frequency addressing 308
- dual fringe field switching (DFFS) 295
- DWDM components 3, 283, 360
- dynamic range of LC sensor 3, 383, 387, 393–396, 399, 404, 406, 413

**e**

- effective birefringence 340, 342
- EHD instability 64–66, 387
- elastic constant 24, 26, 30, 33, 96, 162, 179, 181, 183, 184, 186, 187, 189, 191–193, 200, 209, 213, 245, 249, 265, 307, 336, 339
- elastic energy 24, 25, 33, 41, 159, 180, 259, 289, 328
- elastic moduli 14, 26, 41, 159–165, 179, 180, 186, 190–192, 194, 209, 251, 254, 324, 328, 336
- elasticity 1, 24–26, 33, 194, 293, 397
- electrically controlled birefringence 283, 284, 289, 291, 339, 364
- electroclinic effect 209, 215, 325, 326, 362
- electrode
  - control 346
  - pixel 346, 347
  - signal 346
- electronic paper 356
- electrooptical cell 31

- electrooptical effects 1, 7, 29, 42, 203, 208, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323–325, 327–329, 331, 333, 335, 337, 339, 341, 343, 345, 356, 362
- Ericksen number 47, 53, 54, 70, 93
- extended Jones matrix method 186, 301
- extrapolation length 253, 265

## **f**

- fast surface dynamics 95, 103, 265, 266
- ferroelectric domain 337, 338
- ferroelectric effect 338, 362
- ferroelectric liquid crystals (FLCs) 39, 179, 208, 209, 211, 213–217, 263, 323–347, 361–363
  - with memorized gray scale 343, 344
- field emission 346
- field sequential color (FSC) LCD 293, 294
- flexible substrate 34, 359, 369
- flicker 353, 354
- flow
  - Couette 46, 50–52, 54, 66, 67, 70, 95, 104–106, 230, 380
  - decay 58, 60, 64–66, 74, 81, 84, 91, 93, 94, 233–235, 237
  - laminar 47, 223, 241, 403
  - oscillating 54, 66–71, 73, 75, 77, 79, 81, 83–85, 87, 89, 90, 92, 94, 95, 98, 100, 230, 382, 390
  - plane 46, 81, 234, 235
  - Poiseuille 45–49, 51–59, 62–64, 66–72, 74, 81, 90–93, 95, 96, 104–106, 223, 242, 379–381, 387, 388, 408, 412
  - quasistationary Poiseuille 53, 54, 412
  - shear 2, 45–48, 53–56, 68, 87, 95–97, 99, 101, 103–106, 124, 128, 135, 137, 195, 220, 221, 223, 225, 227, 229–231, 233–239, 241–243, 379, 387, 406–408, 412
  - simple shear 54–56, 229, 230, 241–243
- flow-aligned nematics 55
- Fokker-Planck model 46, 123, 131
- frame response 317
- free spectral range (FSR) wavelength shift 370, 371
- Fréedericksz transition 51, 64, 76, 79, 83, 87, 88, 180–183, 185, 186, 189–192, 200, 201, 249, 259, 263, 283–287, 410–412

**g**

- glass surface 38, 39, 255, 256, 260, 384
- gliding
  - azimuthal 266, 267, 271
  - zenithal 266

Goldstone mode 215, 218, 326  
 grating 290, 358, 371, 372  
 gray scale 39, 336–338, 341–345, 359, 362

**h**

helix unwinding 319, 320, 326, 339, 341  
 high birefringence 372  
 high pretilt angle 36, 39, 261, 262, 295  
 homeotropic orientation 33–37, 39, 55–59,  
 61, 64, 65, 70, 71, 75, 77, 94, 95, 102, 181,  
 204, 230, 235–237, 262, 292, 321, 381,  
 383, 387, 395, 407, 412  
 homogeneous instability 51–54, 68, 82  
 hybrid 37, 39, 97, 101, 102, 191, 358, 370,  
 384  
 hybrid boundary condition 100  
 hybrid orientation 102  
 hydrodynamic instability 48, 50, 52, 54, 64  
 hydrodynamic resistance 236, 398  
 hysteresis 213, 263, 287, 309, 315, 340,  
 341, 392, 393  
 – in nematic LC 309

**i**

image sticking effect 355  
 incidence angle 303–305, 312, 364  
 insertion loss 360, 363  
 instability 45, 48–56, 58, 64–71, 81–83,  
 85–87, 90–93, 104, 106, 242, 383, 384, 387  
 – EHD 64–66, 387  
 – homogeneous 51–54, 68, 82  
 – hydrodynamic 48, 50, 52, 54, 64  
 – primary 45, 64, 65, 90  
 intermolecular relaxation 113  
 inversion walls 198  
 “iron law” 348, 349

**l**

laminar flow 47, 223, 241, 403  
 Landau-de Gennes theory 144  
 layered system 167  
 LC cell  
 – geometrical size 116, 236, 240, 396  
 – stripped electrodes 388  
 – wedge-like cell 51, 58, 60, 73, 83, 85, 90,  
 93, 237, 261, 265, 272, 396  
 LC displays 1, 184, 206, 219, 252, 261,  
 263, 283, 334, 342–346, 360  
 LC sensor 382, 383  
 – dynamic range 3, 383, 387, 393–396,  
 399, 404, 406, 413  
 LCD 1, 3, 8, 9, 13, 34, 180, 240, 283, 293–295,  
 298, 302, 303, 305–308, 310, 311, 313–317,  
 322, 323, 337, 342–358, 365, 367, 368

Leslie coefficients 1, 29, 49, 54, 55, 122, 128,  
 129, 137, 138, 145, 179, 200, 206, 220, 222,  
 224, 228, 238, 240, 241, 243–247, 249–252  
 light emitting diode 293, 346, 385  
 light scattering spectroscopy 180  
 linear defect 93  
 linear hydrodynamic models 2  
 linearized hydrodynamic model 122  
 liquid crystal devices 1, 179, 195, 220, 252  
 liquid crystal display 1, 2, 8, 34, 167, 239, 301,  
 343, 346, 347, 349, 351, 353, 355, 357, 359  
 liquid crystal emulsions (LCEs) 170, 171  
 liquid crystal sensors 2, 45, 379–382,  
 384–402, 404, 406, 408, 410, 412, 413  
 long-living domain 93, 94  
 longitudinal wave 111, 112, 121, 135, 142, 167  
 Lorenz-Lorentz equation 17  
 low power consumption 3, 283, 317, 344

**m**

magnetic and electric fields 2, 7, 41, 52, 68,  
 180, 186, 410  
 Mauguin minimum 301, 302, 304, 349  
 Mauguin regime 204, 268, 296  
 maximum director angle 289  
 Maxwell equations 285, 301  
 mechanical perturbations 2–4, 45, 379–381,  
 383, 413  
 memorized gray scale 39, 343, 344  
 microresonator 370, 371  
 mixture preparations 2, 7  
 mode interference 313, 314  
 model  
 – electrically induced gliding 267, 270  
 – Fokker-Planck 46, 123, 131  
 – linearized hydrodynamic 122  
 molecular structure 2, 7, 16, 19, 23, 24, 29,  
 30, 147, 183, 193, 219, 220, 354  
 monodomain 10, 143, 159, 180, 185, 209,  
 222, 239, 249, 290  
 multidomain 34, 201, 309, 321  
 multistable switching mode 338

**n**

nanodomain 36, 295, 296  
 Navier-Stokes equation 26, 27, 407  
 near surface layer 224, 259, 265  
 negative birefringence 316  
 nematic order parameter 123  
 nematic phase 9, 10, 21, 31, 45, 120, 126,  
 127, 129, 134, 139, 143, 145–149, 151–154,  
 156, 161, 171, 186, 187, 193, 194, 206, 211,  
 216, 217, 219, 239, 240, 248, 258, 263–265,  
 330, 406

nematic-smectic A phase transition 49,  
148, 154, 156, 165, 194, 239  
Newtonian liquid 47, 136, 137  
no-bias bend 295  
nonaligned nematics 49, 55  
normally black mode 350  
normally white mode 302, 305

**o**

Onsager equation 20  
operating time 3, 179, 195, 219, 387, 399,  
400, 403, 413  
optical absorption 346  
optical anisotropy 3, 7, 15, 21, 23, 24, 29,  
283, 300, 303, 319, 324, 328, 349  
optical axis 10, 11, 39, 142, 180, 195, 225,  
257, 301, 340  
optical birefringence 184, 218, 328  
optical filters 362, 368, 369  
optical geometry 81, 204, 384  
optical mode interference 313, 314  
optical phase delay 77, 101, 381, 382,  
391–393, 399  
optical response 2, 42, 67, 70, 74, 84, 99, 102,  
106, 209, 212, 213, 238, 286, 287, 289, 292,  
293, 298, 309, 312, 323, 325, 332, 334, 335,  
338, 343, 380, 382, 384, 386–388, 391, 392,  
394, 396–399, 408, 410  
optical sensors 380, 406  
optical switches 361, 362, 368, 371  
optically compensated bend (OCB) 232,  
256, 293–295  
optically rewritable (ORW) 182, 196, 310,  
358–360, 407  
– image 359  
– LCDs 358, 359  
optimized angle 307  
order parameter 8, 9, 19–21, 23, 25, 29,  
45, 46, 51, 52, 57, 94, 119, 123, 131,  
132, 142, 143, 146, 148, 151–153, 156,  
159–162, 170, 194, 207, 219, 252,  
261, 264, 295, 369  
– complex 142  
– variable tensorial 57  
– vector 143, 207  
ordinary and extraordinary rays 59, 225,  
235, 242, 290  
orientation, homeotropic 33–37, 39, 55–59,  
61, 64, 65, 70, 71, 75, 77, 94, 95, 102, 181,  
204, 230, 235–237, 262, 321, 381, 387,  
395, 407, 412  
oscillating flow 54, 66–71, 73, 75, 77, 79,  
81, 83–85, 87, 89, 90, 92, 94, 95, 98, 100,  
230, 382, 390

**p**

parasitic domain 313, 315  
passive matrix (PM) 3, 283, 343, 346–350, 360  
– addressing of FLCs 343  
– addressing of LCDs 349  
– addressing of twist LCDs 305  
passively addressed 298, 302, 311, 313, 314,  
332, 337, 343, 347, 349  
penetration length 137, 173, 230  
permittivity tensor 212  
phase compensator 293, 316  
phase delay 59, 77, 79, 80, 100–103, 181, 205,  
207, 235, 242, 250, 254, 298, 381–383,  
391–393, 399, 410, 411  
phenomenological equation 18  
photoalignment 3, 34–37, 104, 186, 204, 252,  
268, 270, 271, 296, 332, 358, 368–372  
photoalignment technology 252, 368  
photodegradation 34–36  
photodegradation process 36  
photon correlation technique 190  
photonic crystal/liquid crystal (PC/LC)  
structure 367  
piezoelectric transducers 112, 115, 117, 118,  
135  
pipelines 402–405  
pixel electrode 346, 347  
planar orientation 32, 33, 39, 49, 52, 54, 55,  
66, 68, 77, 90, 91, 96, 100, 104, 106, 181, 185,  
200, 203, 204, 237, 259, 287, 290, 296  
planar texture 11, 38, 318  
plane flow 46, 81, 234, 235  
plastic substrate 34, 359, 360  
Poiseuille flow 45–49, 51–59, 62–64, 66–72,  
74, 81, 90–93, 95, 96, 104–106, 223, 242,  
379–381, 387, 388, 408, 412  
Poiseuille formula 223, 403  
polar angle 55, 57, 60, 74, 82, 100, 104, 105,  
181, 206, 234, 250, 254, 303, 356  
polar surface 34, 262  
polarization controller 360, 364, 366, 368,  
372  
polarization grating 371, 372  
polarization reversal current 209, 213, 263  
polarization rotator 365, 366  
polarizer 59, 73, 74, 81, 91, 94, 181, 186, 204,  
209, 241, 250, 268, 290–292, 298–300, 302,  
303, 305, 307, 309–311, 313, 314, 316, 320,  
321, 323, 332, 333, 337–340, 349, 356, 359,  
360, 366, 369, 370, 381, 382, 385, 409  
polyimide 13, 34, 36, 37, 39, 261, 266, 271,  
295, 296, 315, 357, 369, 370  
polyimide surface 36  
polymer network (PN) 186, 321, 367

- polymer-stabilized cholesteric textures (PSCTs) 320
  - polymer-stabilized FLC displays (PSV-FLCDs) 344, 345
  - polymeric nanostructures stabilizing FLCs
    - alignment 345
  - polymers 13, 34, 111, 179, 345
  - potential 34, 40, 41, 97, 134, 143, 208, 253, 254, 287, 309, 347, 358, 360, 367, 380
  - preferred direction 220, 290
  - pressure gradient 3, 53, 55–60, 62, 63, 65, 68–70, 74, 76, 77, 79, 83, 84, 87, 94–96, 104, 106, 223–225, 235, 237, 380–385, 387–389, 391, 393–395, 398, 399, 401, 403, 405, 407, 408, 410, 412, 413
  - pretilt angle 13, 32, 34, 36, 37, 39, 68, 261–263, 292, 293, 295, 296, 299, 301, 303, 314, 315, 348, 350, 356
  - primary instability 45, 64, 65, 90
  - principal shear viscosities 138, 139, 229, 233, 237, 240
  - principal shear viscosity coefficients 228, 238
  - principal viscosities 223, 230–232
  - principal viscosity coefficient 138, 221, 224, 230, 237
  - profiled surface 370
  - PSCT 320–323
  - PSV 344, 345
  - PSV-FLCD 344, 345
  - pure twist deformation 200, 201, 203, 204, 206, 249, 259, 287, 291
- q**
- quasibookshelf geometry 331, 335
  - quasistationary Poiseuille flow 53, 54, 412
- r**
- reagent 350
  - reflection-voltage curve (RVC) 348
  - reflective cholesteric display 323, 347
  - refractive index 21–23, 59, 289, 290, 331, 339, 346, 362, 367, 369–372, 383
  - relaxation
    - of fluctuations 146
    - phenomena 114, 407
    - spectra 148, 149
    - time 17, 60, 64, 79, 80, 105, 123, 141, 146, 152, 170, 199–201, 210, 236, 245, 249, 255, 266, 268, 271, 289, 308, 319, 329, 412
  - residual DC (RDC) voltage 354
  - resolution 34, 116, 140, 157, 199, 271, 293, 322, 345, 348, 350, 369, 406
  - reverse twist mode 308, 309
  - reversible switching in the DHF mode 340
  - Reynolds number 47, 48, 395, 403–405
  - rotating magnetic field 3, 125, 129–131, 134, 172, 197–199, 207, 209, 218
  - rotating magnetic field method 196
  - rotation angle 37, 183, 196, 199, 201, 202, 259, 299
  - rotational viscosity coefficient 3, 111, 125, 129, 132, 172, 179, 195–202, 206–209, 211, 213, 215, 217–220, 226, 227, 239, 240, 243, 249–251
  - row addressing 317, 353
- s**
- S-shaped 338, 339
  - scaling theory 146, 151, 152
  - screen 34, 293, 314, 315, 317, 337, 340, 342, 345, 406
  - second-order transition 143, 144, 147, 148
  - secondary roll 45, 55, 65, 90, 91, 93
  - Seiko scheme 342, 343
  - sensitivity 3, 55, 56, 71, 77, 103, 106, 159, 166, 204, 237, 241, 300, 302, 311, 322, 342, 369, 379–381, 383–385, 388, 394–399, 402–404, 406, 410–413
  - shadowing 317
  - shear
    - flow 2, 45–48, 53–56, 68, 87, 95–97, 99, 101, 103–106, 124, 128, 135, 137, 195, 220, 221, 223, 225, 227, 229–231, 233–239, 241–243, 379, 387, 406–408, 412
    - rate 46–52, 54, 55, 66, 81, 104, 105, 220, 224, 229–231, 241
    - viscosities 135, 137–139, 148, 162, 179, 218, 221, 222, 226, 227, 229, 232, 233, 237–240, 264
    - wave 67, 111, 112, 134–141, 166, 167, 172, 173, 231, 407
  - short pitch 331, 332
  - signal electrodes 346
  - simple shear flow 54–56, 229, 230, 241–243
  - slave substrate 357
  - slow surface dynamics 265–267, 270, 271, 273
  - smectic C phase 10–12, 15, 120, 142, 143, 155, 166, 206–208, 217, 362
  - solid surface 39, 46, 97, 264, 266, 332
  - SSFLC device 337
  - SSFLCD 347
  - stabilization 87, 88, 179, 233, 320, 327, 334, 342–345, 406
  - steady flow 49–51, 53, 55, 57, 59, 61, 63, 65, 69, 85, 104, 231
  - steepness 24, 190, 298, 300–302, 304, 313–315, 317, 348, 349

- stress 27, 95, 135, 137, 140, 141, 209, 350, 352, 407
- stress splay twist mode 352
- stress TN configuration 352
- stripped electrodes LC cell 388
- strong anchoring 33, 39, 97, 99, 100, 103, 186, 252, 253, 255, 256, 258–260, 266, 271–273, 285, 288
- structural relaxation 113, 139
- submicrometer-sized rib 370
- subtractive color system 316
- supertwist angle 313–315
- supertwist nematic (STN) display 8, 313–317, 322, 342, 347, 348, 350, 357, 360
- surface
- alignment 92, 225, 257, 321
  - anchoring 2, 40, 41, 45, 64, 95, 98, 101, 103, 104, 106, 186, 200, 212, 252–255, 257, 259–263, 265, 267–269, 271, 272, 356
  - charge 39
  - coupling agent 34, 35
  - defects 39
  - director 3, 95, 252, 253, 257, 260, 265, 267, 268, 271
  - energy 3, 39, 41, 42, 97, 272, 283
  - layer 3, 31, 71, 95, 98, 141, 179, 198, 210, 224, 252, 254, 259, 261, 263–265, 267, 268, 271, 272
  - orientation 55, 64, 91–93, 230, 267
  - properties 31
  - structure 30, 33, 36
  - traps 39
- t**
- technology 252, 262, 270, 283, 358, 360, 368, 369
- texture 11, 38, 39, 67, 318, 320–322, 329–332, 337, 347, 356, 357
- thermopolymerization 36, 37
- thin film transistor (TFT) 34, 283, 337, 345, 346, 351–356
- threshold
- field for Fréedericksz transition 64, 65, 76, 87, 88, 190, 259, 263, 284–287, 382
  - for the second roll instability 92
  - of a homogeneous instability 51–54, 68, 82
- tilt angle 36, 207, 214, 215, 286, 297, 320, 323–328, 333, 341
- tilted bookshelf structure 331
- TN configuration 350
- torque 27, 41, 49, 55, 66, 70, 197–199, 242, 252, 257–259, 267, 268, 272, 283, 287, 288, 308, 333, 336
- total internal reflection 42, 254, 362, 364
- transmission-voltage curve (TVC) 287, 300–302, 304, 308, 309, 314–317, 341, 348, 349, 351
- turbulent flow 404
- twist angle 38, 182, 183, 257, 302, 313–315, 348, 349, 356, 357, 359
- twist angle switching 357
- twist distortion 25, 191
- twisted nematic (TN) displays 124, 201, 257, 342, 348, 350, 352, 412
- u**
- ultrasonic attenuation coefficient 145
- ultrasonic methods 3, 111, 112, 124, 137, 167, 168, 170, 172, 207, 219
- ultrasonic velocity 112–116, 123, 124, 132, 147, 148, 157, 161, 163, 167
- ultrasonic waves 112, 113, 118, 167, 172, 199, 406, 407
- uniformity 285, 292, 293, 295, 304, 307, 310, 311, 313, 314, 316
- v**
- V-shaped 338, 344, 345
- variable optical attenuator (VOA) 360, 366, 369, 372
- vector order parameter 143, 207
- viewing angle 303, 305, 309, 310, 314, 316, 317, 321, 322, 350, 351, 355, 356
- wide 316, 321
- viscoelastic
- characteristics 2
  - parameters 1–3, 24, 42, 104, 159, 167, 179, 190, 207, 406
  - properties 2, 3, 7, 24, 57, 111, 114, 142–145, 147, 149, 151, 153, 155, 157, 159, 161–163, 165, 167–169, 171, 172, 247–249, 271, 407
  - relaxation 137
- viscometers 221
- viscosity measurements 2, 30, 49, 145, 180, 217, 220–222, 227, 229, 232, 239, 240, 249, 251
- viscous torque 49, 197–199
- visualizing 58, 405, 407, 409, 411
- voltage holding ratio (VHR) 294, 353–355
- volumetric flow 223, 225, 233, 235, 236
- w**
- walls 9, 31, 39, 53, 90, 94, 197–200, 229, 230, 254, 287, 298, 299, 308, 333, 403
- waveguide 299, 362, 365, 369, 370
- waveguide-coupled microresonator 370

wavelength shift 370

waves 67, 111–113, 117, 118, 121, 134–139,  
141, 142, 167, 172, 173, 187, 199, 231,  
406–408, 410

weak anchoring 2, 7, 95, 97–101, 103–105,  
186, 253, 254, 256, 257, 263, 265, 269,  
271, 285, 287, 330

wide viewing angle 316, 321

Williams's rolls 64

## **z**

ZBD 358

zenithal anchoring 255

zenithal bistability (ZBD) 358