

Index

absolute distribution density 112
absolute ensemble mean 13
absolute means 15–17, 42, 202, 219
absolute probability 12
adhesion condition 20
admixture distribution coefficient 30
admixture flux 243
Basset force 251
Batchelor's method 36
Bayes formula 12
Biot number 161
Boltzmann–Clausius equation 119
Born–Bogolyubov–Green–Yvon–Kirkwood kinetic equations 51
Böttcher equation 62
Bruggeman equation 62, 63
Carnahan–Starling statistical model 119
characteristic function 13, 15, 20, 44, 201
Clausius–Mossotti theory 62

- collision frequency 117, 118
- concentration gradient 80, 89, 91, 93, 230
- concentric layer 37, 38, 50, 66, 124, 127, 128, 135, 136
- conditional concentration 14, 42, 47, 49, 123, 248, 251
- conditional distribution density 112
- conditional means 13, 15–17, 33, 42, 219
- conditional probability density 33
- conditional probability distribution 32
- conditional volumetric concentration 52, 124, 127, 136
- conductive flux 56
- configuration ensemble 2, 9, 11, 13, 18, 33, 95, 202
- conservation equations 8, 10, 11, 18
- conservation of mass, momentum and energy 19
- contact conductivity 5, 6, 23, 57, 60, 62, 68, 94, 101–103, 113, 114, 119, 120, 138, 140, 142, 172, 176, 184
- continuous phase 5–7, 10, 14, 17–19, 21–23, 37, 40, 43, 55–57, 61, 103, 106, 109, 111–115, 120, 122, 140, 153–155, 159–162, 164–167, 170, 172, 176, 178–180, 184, 191, 195, 206, 213, 229, 252
- convective heat conduction equation 18
- convective heat flux 4, 194
- coordination number 104, 105, 111, 112, 115, 119, 121, 123, 125, 126, 129, 137
- Curie principle 80, 81
- detailed concentration 201
- detailed density 13
- detailed function 15, 17
- detailed temperature 18, 38, 153
- dielectric constant 37, 247
- dipole approximation 40, 41, 58, 70, 73, 78, 79
- dispersed phase 1, 2, 5, 6, 13–16, 18, 21, 22, 28, 31, 35, 42, 47–49, 52, 56–58, 65, 66, 69, 70, 94, 98, 109, 111, 121–124, 135, 136, 153, 156, 165–167, 171, 172, 177, 178, 180, 184, 191, 192, 196, 198, 199, 201, 202, 204, 205, 217, 218, 226, 230, 231, 234, 246–248, 254
- distribution function 26, 35, 37, 50–54, 69, 104, 105, 109, 117, 123, 248
- distribution function density 69
- dyadic multiplication 81
- effective diffusion coefficient 2, 30, 31, 58, 97, 213, 238, 242
- effective permeability 64, 79, 101, 248
- effective skeleton thermal conductivity 105, 109, 110, 114

- effective thermal conductivity 4, 5, 22, 23, 27–31, 35, 36, 41, 53, 55–61, 63, 64, 68, 71, 77–79, 81, 90, 93, 94, 97, 98, 100–102, 110, 120, 122, 126–129, 137, 138, 140, 141, 143, 148, 149, 151, 152, 175, 184, 189, 191, 192, 249
- Einstein and Taylor formulas 32
- electrical conductivity 29, 32, 53, 59, 62, 63, 66, 67, 100–103, 111, 113, 120–122, 131, 139, 140, 141, 143, 146, 147, 149, 151
- electromagnetic wave 199, 246–248, 250, 252, 255
- ensemble averaging operations 16
- Enskog factor 118, 119
- Enskog's semi-empirical model 118
- equations of state 10, 27, 33, 42, 53, 54, 122
- fissured media 38, 79
- fluid-infiltrated granular bed 10, 13
- fluidization velocity 110
- Fourier law 4, 21
- Fourier equation 95, 98, 154, 167, 182
- Fourier number 152, 153, 155–157, 183
- Fourier transform 44–46, 167, 177, 179, 184–189, 192, 206, 207, 209, 211, 214, 237, 241, 242, 246, 250
- Fourier transformation 44, 46, 47, 167, 171, 177, 184, 237, 239, 246
- Gauss theorem 31
- granular bed 3, 5, 6, 9–11, 13, 18, 24, 27, 30, 37, 38, 42, 50–52, 55–59, 61, 62, 64, 67, 68, 80, 92–95, 97, 100–115, 118–121, 123–127, 129, 136, 138, 143, 147, 148, 151–163, 165, 166, 169, 172, 181, 183, 187, 191, 192, 194, 195, 197, 217
- Heaviside function 14, 49, 162
- heat transfer 1–10, 19, 20, 22–25, 27, 29, 32–35, 37, 39–41, 46, 47, 55–57, 61, 63, 80, 81, 92–94, 96, 98, 99, 101–103, 105, 106, 108, 109, 111, 114, 120, 123, 127, 129, 130, 132, 134, 135, 138–140, 142, 143, 147–151, 154, 157–168, 170, 172, 175, 176, 178–181, 183–199, 215, 237
- Hertz problem 109
- hyperchain approximation 51
- hyperspheres 12
- impact parameter 115–117
- indiscernibility 14, 16, 21
- infiltrated porous body 3, 4
- integral Fourier transformation 44
- interphase heat transfer 3, 5, 6, 8, 22, 24, 29, 47, 150, 151, 163, 166, 175, 176, 186–188, 190, 192, 195
- joint density 35

- joint probability 12
- Kirkwood superposition approximation 34, 51
- Knudsen layer 19, 97, 99
- Knudsen number 57, 95
- Kramers model 239
- Laplace equation 28, 31, 32, 64, 83–85, 103, 128, 136
- Legendre polynomial 84, 187, 208
- Markovian process 121
- Maxwell equations 245, 246
- Maxwell–Wagner equation 29, 30, 62, 63, 69, 70
- mean admixture mass flux 30
- mean collision duration 117
- mean concentration 4, 5, 9, 31, 37, 203–206, 210, 213, 214, 219, 225, 231
- mean filtration velocity 4
- mean heat flux 2, 4, 8, 10, 21, 23, 27, 29, 47, 50, 64, 69, 80, 81, 86, 88–90, 96, 97, 103, 105, 106, 108, 109, 112, 114, 122, 151, 159, 183, 188, 190, 191
- mean mass flux 206
- mean perturbation 207
- mean phase temperature 4, 8, 9, 18, 27, 42, 45–47, 50, 61, 64, 81, 94, 123, 134, 150, 151, 153, 165, 175, 176, 178, 180, 184, 188, 192
- mean porosity 23, 29, 69, 71, 80, 96, 97, 105, 107, 108, 109, 114, 134, 159, 175, 190, 191
- mean temperature 4, 10
- mean temperature gradient 23, 29, 69, 71, 80, 96, 97, 105, 107–109, 114, 134, 159, 175, 190, 191
- mean velocity 4, 10
- mean volumetric concentration 4, 123, 135
- Mie theory 248
- moderately concentrated dispersions 70, 97, 123, 200, 217
- moderately concentrated medium 78, 79
- moderately dilute dispersions 90
- Monte Carlo method 51, 53, 119
- Newtonian fluid 9, 171
- non-overlapping 11, 12, 23, 37, 38, 47, 48, 70, 79, 82, 92, 95, 200, 201, 217, 248
- non-overlapping conditions 12
- Nusselt number 152–158, 160, 183
- operations of averaging 13
- overlapping 10, 217

- particle packing 5, 10, 50, 51, 68, 103–105, 108, 111, 113, 124, 126, 127, 155, 156
- Peclet number 5, 27, 42, 99, 162, 166, 176, 184, 192, 252
- Percus–Yewick integral equation 51
- Percus–Yewick equation 51, 53
- Percus–Yewick model 49, 51, 65–68
- porosity 4, 14, 79, 80, 92, 104, 105, 143, 144, 151, 154, 158, 196
- Poisson ratio 116
- Prandtl number 98
- pressure oscillation method 242, 244, 254
- probability 8, 12, 16, 32, 33, 35, 52, 112
- radial distribution function 50–53, 123
- radial correlation function 51
- radiative heat transfer 57, 98, 99
- Rayleigh formula 62, 250
- Rayleigh theory 245
- relaxation time 6, 144, 145, 158–161, 167, 176, 178, 179, 181, 188–192, 210, 216, 219, 228, 238, 245
- Reynolds number 110
- rheological properties 31
- single-temperature model 1, 61, 150, 153, 154
- skeleton conductivity 103, 112, 114, 122, 123, 125, 127, 129, 135, 128, 147, 151, 157, 165
- skeleton electrical conductivity 122
- skeleton thermal conductivity 105, 109–111, 114, 146, 153
- Smoluchowskii method 237
- steady-state granular bed 11
- steady-state thermal conductivity 38, 47–49, 55, 57, 58, 68, 69, 89, 94
- stepwise Heaviside function 13
- structure function 96, 201, 203, 217, 246
- telegraph equation 242, 245
- temperature gradient 23, 29, 69, 71, 72, 80, 89, 96, 97, 105, 107–109, 114, 131, 132, 134, 151, 159, 176, 190, 191
- tensor 5, 23, 43, 69–72, 77, 79–81, 89, 108–110, 134, 239
- thermal conductivity 1, 4, 5, 10, 18, 22, 23, 27–33, 35–38, 40, 41, 46–49, 53, 55–61, 63, 64–70, 72–76, 78, 79, 81, 82, 89, 91–94, 96–102, 105, 106, 109–112, 114, 117, 119–122, 124, 126–132, 134–137, 139–141, 143, 146–153, 159–162, 164–166, 168, 170, 175, 176, 180, 182, 183, 188, 190–192, 194, 195, 199, 201, 215, 248

thermal inertia 6, 23, 160, 161, 163, 187

two-temperature model 2, 4–6, 8, 9, 18, 22, 61, 150, 152, 165, 169, 175, 192–194

vectorial delta function 13

volumetric concentration 4, 14, 28, 34, 41, 42, 47–50, 52, 58, 60, 65, 66, 70, 76, 80, 81, 89, 92, 93, 102, 104, 109, 119, 120, 123, 124, 126–128, 135, 136, 225, 232, 248

Young's modulus 109, 111, 116

Wiedemann–Franz law 141, 142