
Index

- N*-body simulation** 4, 12, 25, 29–41, 44, 45, 74, 95–103, 105, 106, 112, 114, 117, 120, 125, 132, 135, 141, 149, 155, 161, 165, 167, 170, 174, 184, 185
- Γ -distribution** 71, 72
- Λ CDM** lambda cold dark matter 8, 20, 22, 24, 53, 80, 117, 119, 126, 129, 150, 157
- 21 cm surveys** 106
- 2LPT** second-order Lagrangian perturbation theory 24, 29–32, 34, 35, 37–44, 68, 69, 73–75, 80, 81, 83, 86, 87, 89, 91, 96, 98, 99, 101–105, 109–114, 121, 122, 125, 126, 133, 135, 138, 141, 148, 154, 155, 168, 177, 178, 185
- 2LPTRM** second-order Lagrangian perturbation theory remapped 30–32, 34, 35, 103, 104
- 2LPTic** 29, 177
- 3LPT** third-order Lagrangian perturbation theory 41
- ABC** Approximate Bayesian Computation 56
- acceptance rate** 59, 60, 62, 66, 74, 81, 82, 91
- adhesion approximation** 26, 27, 96
- Alcock-Paczynski effect** 2, 9, 126
- aliasing** 31, 169, 170
- ALPT** Augmented Lagrangian perturbation theory 43, 44
- ARES** Algorithm for REconstruction and Sampling 66, 70, 75, 77
- assignment function** 169–171, 173
- auto-correlation function (Markov chain)** 60
- BAO** baryon acoustic oscillations 2, 3, 67, 74, 96, 97, 157, 178
- Bayes factor** 57
- Bayes’ theorem** 51–54, 57, 71
- Bayesian statistics** 4, 49–53, 56, 62, 71, 111, 118, 129, 138, 149, 155
- BBN** Big Bang nucleosynthesis 2
- Bernstein-von Mises theorem** 53
- bias** 2, 34, 52, 62, 66, 68–70, 74, 75, 77, 79–83, 89, 91, 117–119, 121, 125–129, 134, 135, 137, 148, 155, 157
- bispectrum** 15, 34–37, 95, 105, 106, 156
- Blackwell-Rao estimator** 119, 120, 122, 124–127, 129
- Boltzmann constant** 61
- BORG** Bayesian Origin Reconstruction from Galaxies 4, 49, 56, 60, 63, 66–72, 74–77, 79, 80, 82, 86, 89, 91, 92, 109–114, 117, 119–123, 125–129, 131, 133–136, 138, 143, 148, 149, 151, 154–157, 177, 178
- Box-Müller method** 177
- Burgers’ equation** 26, 27
- burn-in** 58, 60, 73–75, 81–83, 91
- canonical distribution** 61, 62
- cdf** cumulative distribution function 97, 100, 101
- CDM** cold dark matter 2, 8, 15, 18, 20, 22, 95, 165
- characteristic function** 161–163
- Cholesky decomposition** 178
- chrono-cosmography** 79, 80, 89, 92, 131, 133, 143, 148, 155, 158
- CiC** cloud-in-cell 29, 31, 34, 68, 73, 74, 101, 113, 138, 170–175, 178, 184, 185
- classical mechanics** 60, 113
- cluster** 4, 29, 37, 38, 40, 44, 45, 75, 91, 92, 96, 99, 100, 103, 111, 118, 126, 131–137, 140–142, 145, 147–152, 154, 156, 179, 181–185
- CMB** cosmic microwave background 10, 52, 62, 75, 118, 129, 133, 156, 157
- CMB lensing** 62, 157
- COLA** COmoving Lagrangian Acceleration 109, 111–114, 133–136, 138, 148, 155, 165–168, 170, 175–177
- comoving coordinates** 10, 16, 22, 23, 25, 37, 40, 68, 74, 75, 86, 89, 90, 92, 106, 147, 166, 182, 185
- compensation** 118, 128, 132, 137
- conditional density contrast** 14
- conditional independence** 11, 71, 75, 121, 124, 161–163

- conditional pdf** 11, 14, 51, 58, 60, 67, 71, 72, 77, 136, 140, 150, 163
- conformal expansion rate** 8
- conformal time** 8, 16, 22, 23, 182
- conservative map** 151, 152, 154
- constrained likelihood** 53
- constrained simulation** 109, 110, 117, 119, 121, 122, 128, 131, 133, 134, 140, 148, 155, 178
- continuity equation** 17, 19, 25
- Cosmic Emulator** 30, 31
- cosmic time** 8
- cosmic variance** 32, 34, 118
- cosmic web** 1, 4, 29, 40, 75, 91, 110, 118, 121, 123, 131–135, 140, 147–149, 154–156, 158, 179
- cosmic web classification** 4, 24, 44, 56, 131, 133–136, 138, 140, 142, 147–150, 154, 156, 179, 181–185
- cosmological constant** 8, 20
- cosmological parameters** 8, 15, 19, 20, 22, 30, 37, 42, 62, 67, 74, 75, 80, 101, 103, 106, 125, 138, 157, 178, 185
- CosmoMC** 58
- cosmostatistics** 3, 10, 49
- Cox’s desiderata** 51, 53
- Cox-Jaynes theorem** 51
- Cromwell’s rule** 53
- cross-correlation** 32, 33, 42, 43, 75, 105, 113, 114, 129, 148, 154, 156
- curse of dimensionality** 63–66
- dark energy** 2, 8, 19, 54, 56, 118, 125–127, 157, 158
- dark matter** 2, 15, 17, 18, 40, 117–119, 125, 129, 135, 155, 156
- dark matter particles** 15, 29, 31, 32, 34, 41, 42, 68, 74, 80, 86, 87, 89, 90, 92, 95, 107, 111–113, 119, 122, 123, 125–128, 138, 166–170, 172, 173, 175, 178, 185
- dark matter void** 4, 110, 111, 117–120, 122–129, 155
- dark-energy domination** 2, 8
- data** 52, 53, 66, 68, 71, 72, 74, 75, 79, 80, 83, 85, 86, 89, 92, 110, 117, 119, 122–124, 127–129, 133–140, 142–144, 147–152, 154–158
- data assimilation** 4, 63, 155, 157, 158
- data model** 4, 54, 63, 66, 67, 69, 70, 155, 157
- decaying mode** 19–21, 23
- decision theory** 4, 149–152, 154, 156
- declination** 68, 86
- decoupling** 2
- density contrast** 9–13, 16–19, 22, 23, 30, 34, 37–41, 43, 67–69, 73, 75, 95, 97–99, 101, 103, 104, 106, 121, 122, 136, 137, 141, 142, 168, 169, 172, 173, 178, 180–182, 184, 185
- density field** 2, 4, 10, 12, 17, 19, 21–26, 29–34, 37, 41–45, 66–69, 72, 74–77, 79–86, 88, 89, 91, 92, 95–107, 109–114, 118–122, 124–126, 129, 131–136, 138, 141, 143, 147, 148, 154–156, 167–170, 177, 179, 180, 184, 185
- density profile** 117–119, 122, 125, 127–129, 180, 181
- detailed balance** 58–60
- diffusion equation** 27
- Dirac delta distribution** 13, 15, 52, 55, 67
- displacement field** 22, 23, 25, 29, 31, 37, 40, 41, 44, 112, 132, 155, 156, 166, 168, 177, 178
- DIVA** DynamIcal Void Analysis 40, 132
- divergence of the Lagrangian displacement field** 23, 29, 37–42
- drift** 74, 166, 175–178
- eigenvalue** 23, 24, 44, 132, 134, 136, 137, 141, 142, 178, 181–185
- Einstein’s equations** 8, 132
- Einstein-de Sitter universe** 20, 21
- ellipticity distribution** 117, 119, 122, 125–127, 129, 180, 181
- ensemble average** 9, 12–14
- entropy** 134, 138, 139, 142–144, 147, 148
- EPT** Eulerian perturbation theory 7, 18, 21, 25, 96, 101, 107, 132

- equation of motion** 15–17, 19, 22, 73, 74, 112, 166, 182, 183
equation of state 1, 8, 18, 54, 56, 126, 157
ergodicity 9, 58
estimator 37, 44, 50, 52, 99, 179
Euler’s equation 17, 19, 25, 26, 96
Euler’s method 175
evidence 52, 54, 56, 57
exascale computers 3
excess kurtosis 38, 40
expansion 1, 2, 15–17, 19, 23, 118, 147, 157
exploration of the posterior 54, 55, 62
extended logic 49, 51
fair game 151
FDA finite difference approximation 168, 174, 178
filament 4, 24, 26, 29, 44, 45, 75, 79, 83, 86, 91, 96, 99, 111, 121, 131–137, 140, 142, 145, 147–150, 152, 154, 156, 179, 181–185
final conditions 40, 41, 67, 68, 71, 72, 74, 75, 77, 80–86, 88, 89, 91, 92, 97, 98, 100, 106, 109–111, 113, 114, 117, 119, 122, 128, 132–139, 141–143, 147, 151, 152, 154, 155, 157, 158, 175, 185
flat prior 53
fluid 2, 15, 17, 18, 22, 23, 25, 27, 96, 155, 165, 178
formation history 2, 4, 63, 71, 79, 80, 86, 88, 89, 91, 92, 96, 126, 131, 133, 134, 143, 148, 155, 156
forward modeling 51, 68, 74, 110, 135
Fourier transform 3, 41, 161, 162, 169–171, 173, 174, 178, 184
free-particle approximation 27
frequentist statistics 49–53, 57, 124
Friedmann’s equations 8, 16, 17, 19, 20, 167
frozen flow approximation 26
full gravity 29, 32, 37, 39–43, 68, 69, 95–101, 103–106, 109–111, 114, 117, 119, 121, 128, 131, 135, 148, 155
Gadget-2 29, 109–114, 121, 125, 155, 174, 185
gain function 150, 151, 154
galaxy formation 2, 69, 118, 121, 156
galaxy survey 1, 2, 4, 9, 12, 15, 29, 40, 62, 64, 66, 80, 86, 89, 95, 97, 106, 107, 117, 118, 120, 128, 129, 132, 134, 149, 155
galaxy void 117, 118, 120, 122, 124–129
Gaussian kernel 43, 174, 184
Gaussianization 96, 97, 106
general relativity 2, 7, 8, 15, 54, 56, 127, 133
Gibbs sampling 60, 75
gravitational constant 8
gravitational evolution 1, 2, 7, 9–11, 15, 16, 18, 24, 25, 97, 110, 126, 133, 155, 156, 182
gravitational field 25, 184
gravitational potential 9, 16–18, 23, 25, 26, 44, 136, 157, 166–168, 173, 174, 181, 183, 184
Green function 173, 174, 184
grf Gaussian random field 2, 4, 10–12, 14, 41, 55, 66, 67, 74, 75, 77, 83, 86, 91, 118, 121, 122, 125, 129, 132, 134, 135, 138, 142, 143, 155, 161, 162, 177, 185
growing mode 19, 21, 23, 24
HADES HAmiltonian Density Estimation and Sampling 12, 66
halo 2, 24, 26, 31, 38, 40, 45, 113, 119, 132, 133, 135, 141, 148, 183
Hamilton’s equations 61, 62, 66, 73, 175
Hastings ratio 59, 60
HDM hot dark matter 2
Helmholtz decomposition 43
high-dimensional function 65, 89
high-dimensional parameter space 53, 55, 56, 59, 60, 64, 65, 72, 73, 75, 80, 82, 89, 91, 121, 133–135, 155
high-order correlation function 2, 10, 11, 14, 40, 79, 83, 86, 89, 91, 95, 96, 99, 101, 106, 119, 121, 132, 134, 135, 148
HMC Hamiltonian Monte Carlo 60–63, 66, 72–74, 77, 80, 89, 121, 135, 155, 157
homogeneous Universe 8, 16, 19, 64, 96, 158

- Hot Big Bang** 1, 2
Hubble flow 16, 112
Hubble parameter 8, 19, 20
Hubble radius 15
hypothesis testing 50, 54
inference 49, 50, 52, 54, 62, 79, 80, 85, 89, 91, 92, 133–135, 143, 148, 154, 156, 157
inflation 1, 2, 9, 10, 132, 156
inflaton 1
information content 2, 4, 86, 92, 95, 97, 106, 107, 135, 138, 139, 142–144, 147, 148, 156–158, 169
information theory 51, 131, 134, 138, 148, 156
initial conditions 1–4, 10, 15, 24, 29, 31, 32, 37, 40, 41, 43, 62, 66–69, 71–75, 77, 79–86, 88, 89, 91, 92, 97–101, 104–106, 109–111, 113, 117, 119–122, 124, 125, 128, 129, 131–135, 138, 141–144, 148, 151, 154–158, 161, 165–167, 175–178, 182, 185
integrated Sachs-Wolfe effect 118, 129, 133, 157
interpolation 166–168, 172–175, 178
invariant distribution 58
inverse problem 51, 91
isocurvature perturbations 56, 157
Jeffreys’ priors 53
Jeffreys’ scale 57
Kac’s theorem 161, 163
KDK kick drift kick 74, 175
kick 62, 74, 166, 168, 175–178
Kronecker symbol 18, 73, 136
Kullback-Leibler divergence 134, 138–140, 143, 144, 148
Lagrangian potential 24, 42, 44, 178, 182
Lagrangian transport 85, 89, 90, 92, 110, 122, 135, 147, 148, 158
large-scale structure inference 4, 63, 66, 69, 74, 75, 79, 82, 86, 89, 90, 107, 109, 112, 117–120, 129, 131, 133–135, 148, 149, 154–157, 177
large-scale structure likelihood 68, 69, 71, 75, 109, 119, 129, 135
leapfrog 73, 74, 175, 176
lightcone 9, 69, 157
likelihood 52–54, 56, 57, 60, 68, 73, 134
likelihood-free methods 56
linear evolution 2, 96
linear growth factor 19–21, 23, 25, 40, 73, 113, 167, 177
linear potential approximation 26
linear regime 19, 23, 26, 30, 32, 63, 89, 109, 111, 119, 120, 132, 135, 157
Liouville’s theorem 17, 61
local 23–26, 37, 41, 69, 99, 107, 133, 169, 180
local Lagrangian approximations 42
local tidal approximation 26
log-normal distribution 10, 12, 31, 62, 83, 91, 118, 134
low-pass filter 169–171
LPT Lagrangian perturbation theory 4, 7, 22, 23, 25, 29–35, 37–45, 95–103, 105–107, 110, 112, 113, 132, 135, 141, 155, 165–168, 177, 178
LSS large-scale structure. 1–4, 9, 15, 29, 37, 45, 64, 66, 71, 79, 80, 82, 83, 86, 88, 89, 91, 92, 95–97, 99, 101, 106, 109, 110, 117–119, 121, 122, 126–128, 131–135, 137, 138, 141–143, 147–153, 155–157, 181
luminosity 66, 68–71, 74, 79–81, 83, 86, 88, 89, 91, 121, 122, 129, 133–135, 156
machine epsilon 65
machine learning 51
marginal pdf 11, 54, 55, 57, 58, 62, 68, 163
mask 52, 66, 70, 74, 80, 86, 118, 134, 154
mass matrix 61, 73, 74
mass resolution 30, 106, 168, 185
matter domination 2, 8, 15, 67
maximum-entropy 51
MCMC Markov Chain Monte Carlo 49, 56, 58–60, 65, 82, 91, 119

- mesh assignment** 34, 68, 101, 147, 166, 168, 170–174, 184
- Metropolis ratio** 59
- Metropolis update** 59, 62
- MFF** mass filling fraction 131, 133, 140, 141, 143, 146–148
- MH** Metropolis-Hastings 59, 60, 62, 65
- mildly non-linear regime** 4, 30–32, 34, 37, 63, 89, 95–97, 100, 105, 106, 109–111, 119, 120, 132, 134, 135, 155, 157
- mock catalog** 63, 74–76, 95–97, 101, 106, 118
- mode coupling** 96, 97, 112, 134, 166, 167
- model comparison** 15, 49, 50, 53, 54, 56, 57, 119
- moment** 10, 11, 15, 17, 18, 40, 96
- momentum** 17, 18, 61, 62, 96, 166–168, 173, 175–178
- MUSCLE** Multiscale spherical collapse 42, 43
- N-GenIC** 29, 177
- nested model** 57
- neutrino** 2
- Newtonian gravity** 15, 27
- NGP** nearest grid point 68, 170, 171, 173
- no-free lunch theorem** 49, 53, 58
- noise** 52, 54, 66, 69, 79, 83, 85, 89, 91, 118, 119, 121, 127–129, 135, 148, 155
- noise parameter** 66, 70–72, 75, 77, 80, 81, 83, 89, 129
- non-committal prior** 57
- non-Gaussianity** 4, 10, 30, 34, 40, 41, 56, 62, 67, 119, 121, 124, 135, 156
- non-linear approximation** 7, 25, 96
- non-linear evolution** 2, 4, 10, 23, 25, 40, 43, 66, 95–97, 101, 106, 107, 110, 119, 121, 134, 141, 155, 157
- non-linear filtering** 4, 109–113, 119, 121, 127–129, 134–136, 141, 147, 155
- non-linear regime** 12, 19, 25, 26, 32, 44, 97, 106, 107, 111, 114, 128, 131–135, 148, 149
- non-local** 21, 24, 25, 31, 34, 40–42, 69, 85, 86, 89, 90, 92, 122, 134, 174
- non-magnetic approximation** 26
- nuisance parameters** 54, 61
- number function** 68, 71, 84, 103, 117, 119, 122, 125, 126, 129, 180
- Nyquist wavenumber** 31, 111, 169, 171
- Nyquist-Shannon sampling theorem** 169
- Occam’s razor** 56, 57
- OCDM** open cold dark matter 20
- one-point distribution** 10, 12, 30, 31, 37, 40–42, 75, 95–101, 103, 106, 121, 134, 135, 155
- ORIGAMI** Order-ReversIng Gravity, Apprehended Mangling Indices 40, 132
- pancake** 24, 26, 182
- paradigms of science** 3
- parameter inference** 49, 50, 54, 56, 58
- particle realization** 29, 41, 44, 45, 68, 72, 74, 75, 86, 98, 99, 101, 103, 104, 109–114, 155, 177, 178
- partition function** 61
- path integral formalism** 96
- pdf** probability distribution function 2, 9–13, 30, 31, 37, 40, 52–54, 56–58, 60, 61, 65, 66, 75, 97–99, 101, 103, 119, 129, 134, 136–145, 147, 155, 161, 162
- peculiar velocity** 16–18, 66
- peculiar velocity flow** 17, 25
- periodic boundary conditions** 29, 74, 98, 104, 113, 122, 168, 172, 175, 185
- phase** 32, 44, 105, 126, 134, 156
- phase space** 17, 18, 40, 61, 62, 74, 119, 132, 156, 175
- photometric redshift** 52, 62, 66, 157
- physical density prior** 67, 68
- plausibility** 51
- plausible reasoning** 49, 51
- PM** particle-mesh 4, 112, 113, 165–170, 173–175, 177, 178

- Poisson equation** 17, 19, 23–27, 42, 166–168, 173, 181, 182, 184
- Poisson intensity field** 69, 70
- Poisson likelihood** 69, 71, 85, 121
- Poisson process** 69, 74, 85, 91, 138
- posterior** 4, 52–58, 63, 66, 71, 72, 74, 75, 77, 82, 86, 119, 121, 122, 124, 129, 134–136, 138–145, 147, 148, 150–152, 154–156
- posterior mean** 54, 75, 81, 83–85, 91, 92, 136, 137, 140–142
- posterior odds** 57
- posterior standard deviation** 54, 75, 81, 83, 85, 89, 91, 92, 137
- potential well** 2, 21, 95
- power spectrum** 2, 13–15, 29–34, 41, 42, 44, 62, 66, 67, 74, 75, 77, 80–83, 91, 95, 99, 100, 105, 106, 111, 112, 118, 119, 122, 125, 126, 134, 138, 177, 178, 185
- principal component analysis** 66
- prior** 12, 49, 52–54, 56, 57, 66–69, 71, 73, 75, 77, 117, 119, 121–123, 126–129, 134, 135, 137–145, 147, 148, 150, 151, 154, 156
- prior choice** 52, 53
- prior volume** 53, 57
- probability (definition)** 50
- probability theory** 4, 49–53, 149, 155
- proper prior** 53
- proposal distribution** 59, 60, 62, 65
- quantum field theory** 2, 96
- quantum fluctuation** 1, 10
- radiation domination** 2
- recombination** 2
- reconstruction** 3, 32, 62, 69, 75, 79, 92, 96, 99, 111, 114, 118, 119, 121, 123–129, 133–136, 155, 184
- redshift** 8, 29–38, 40, 41, 52, 68, 75, 80, 86, 95, 97, 98, 101–106, 110–114, 119, 134, 140, 147, 151, 154, 157, 177
- redshift-space distortions** 2, 9, 66, 69, 127, 135, 157
- reduced bispectrum** 15
- Rees-Sciama effect** 133, 157
- reionization** 106
- remapping** 4, 30–35, 95–107, 110
- remapping function** 97, 100–103
- renormalization group flow** 96
- renormalized perturbation theory** 96
- reversibility** 58, 61, 62, 74
- right ascension** 68, 86
- risk aversion** 151, 152, 154
- sample** 4, 50, 55–59, 63–65, 68–72, 74, 75, 77, 80–91, 109–113, 121–124, 129, 134–138, 140–142, 147, 148, 151, 154, 155
- sample average** 9, 13
- sampling** 55, 56, 58–61, 63–67, 71, 72, 74, 75, 77, 89, 118, 119, 121, 122, 126, 128, 129, 135, 155, 157, 169, 170
- Savage-Dickey ratio** 57
- SC spherical collapse** 24, 26, 42, 43, 96, 183
- scalar field** 1, 9, 10, 12, 136, 161, 162
- scalar part** 43, 44
- scale factor** 1, 8, 19, 20, 42, 67, 82, 85, 86, 88, 89, 91, 114, 121, 138, 147, 166, 175, 176
- SCDM standard cold dark matter** 20
- Schechter luminosity functions** 74, 80
- Schrödinger equation** 27
- Schur-complement** 163
- SDSS Sloan Digital Sky Survey** 4, 53, 56, 70, 74, 79, 80, 82, 84, 86, 89, 91, 92, 117–126, 128, 129, 131–135, 137, 139, 140, 142–144, 147–149, 151, 154, 155
- second-order growth factor** 21, 24, 73, 167, 177
- selection effects** 2, 52, 66, 68–70, 74, 79, 80, 83, 86, 89, 91, 118, 119, 121, 122, 125, 126, 129, 134–136, 140, 148, 154, 155, 157
- shape function** 169–171, 173
- sheet** 4, 24, 29, 44, 45, 79, 96, 99, 117, 131–137, 140, 142, 145, 147–150, 152, 154, 156, 179, 181–185

- shell-crossing** 18, 22, 24, 26, 42, 44, 96, 97, 106, 155, 182
shot noise 37, 85, 129, 180
single-stream approximation 18, 26
skewness 30, 38, 40
sparsity 53, 64, 117–119, 121, 125–129
spectroscopic redshift 80
speculative map 151, 152
statistical homogeneity 1, 2, 4, 9, 12–15, 67, 69, 135, 178
statistical isotropy 1, 2, 4, 9, 12, 13, 15, 69, 135, 178
statistical mechanics 61, 96
statistical uncertainty 4, 55, 69, 79, 89, 91, 92, 105, 119, 124, 126, 127, 129, 156
stress tensor 17–19
structure formation 2, 4, 7, 10, 15, 18, 24, 40, 44, 54, 66–68, 71, 74, 75, 79, 86, 89, 91, 95, 96, 101, 105, 106, 109–112, 119, 121, 122, 131–134, 136, 141, 148, 149, 154, 155, 157
structure type 44, 45, 75, 96, 99, 100, 131–145, 147–152, 154, 155, 179, 181–184
Sunyaev-Zel'dovich effect 133, 157
survey geometry 52, 70, 74, 75, 79, 83, 86, 89–92, 110, 119, 121, 122, 125, 126, 129, 135, 137, 140, 148, 151, 154, 155
survey response operator 66, 70, 74, 83, 122, 123, 140, 143, 147
symplecticity 61, 62, 74, 175
systematic uncertainty 55, 79, 82, 86, 89, 119, 126
T-web 132–138, 142, 143, 148, 150, 154, 179, 181–185
three-point correlation function 34, 35, 37, 86, 95, 100, 103, 105, 106, 121, 135, 155
tidal effects 24, 34, 126, 135, 183
tidal field 126, 131–133, 137, 154, 156, 182, 183
tidal tensor 22, 132, 134, 136, 137, 141, 142, 147, 148, 181, 182, 184, 185
transfer function 98, 100, 101, 103, 104, 106, 112
transition probability 58–60
trispectrum 15
TSC triangular shaped cloud 170, 171, 173
two-point correlation function 2, 12–14, 31, 32, 34, 44, 83, 95, 100, 103, 105, 106, 111, 118, 121, 122, 134, 135, 155
uncertainty quantification 50, 52, 53, 55, 63, 75, 76, 79, 80, 82, 85, 89, 91, 92, 110, 112, 117, 119, 121, 122, 124, 129, 131, 133–136, 138, 148, 155
utility function 150, 151
V-web 132, 150, 184
vector part 41, 43, 44
velocity dispersion 17, 18
velocity field 9, 16, 18, 19, 21, 22, 24–26, 75, 80, 86, 87, 91, 120, 128, 133, 134, 155, 157, 184
velocity potential 25, 26, 96
velocity profile 128
velocity shear field 132, 184
VFF volume filling fraction 44, 45, 99, 131, 133, 135, 140, 141, 143, 145, 147, 148, 150
VIDE Void IDentification and Examination toolkit 119, 121–124, 126, 127, 129, 155, 179–181
viscosity 18, 26, 27, 96
Vlasov equation 17, 18
Vlasov-Poisson system 17, 18, 32, 96, 110, 181
void 4, 24, 29, 38–41, 44, 45, 86, 91, 92, 96, 99, 100, 111, 117–129, 131–137, 140, 142, 145, 147–152, 154–156, 179–185
void hierarchy 1, 117, 118, 121, 128, 129, 132, 134, 180
void-in-cloud 43, 128
void-in-void 128
Voronoi tessellation 121, 122, 179–181
vorticity 19, 23–25
watershed transform 121, 180
WDM warm dark matter 157
weak gravitational lensing 118, 129, 133, 157
white noise 177

-
- Wick's theorem** 11, 14
- Wiener filter** 11, 75, 77
- WMAP-7** 30, 101
- ZA** Zel'dovich approximation 23–27, 29–32, 34, 35, 37, 38, 40, 41, 43, 44, 96, 98, 99, 101–105, 112, 155, 168, 177, 178, 182
- ZARM** Zel'dovich approximation remapped 30–32, 34, 35, 103, 104
- ZOBOV** 119, 121, 122, 179, 180