
Index

- Abel summability, 214
- amplitude, 236
- asymptotic expansion, 229

- Bessel functions, 222
- Bessel's inequality, 192
- bounded linear map, 3
- bounded set, 14
- bump function, 57
- Burgers' equation, 49

- the space C^0 , 4
- the space C^1 , 5
- the space C^ℓ , 5
- Cantor's diagonal argument, 274
- Cauchy sequence, 38
- Cauchy sequence in normed space, 194
- Cauchy-Schwarz inequality, 184
- Cesàro summability, 214
- characteristic coordinates, 89
- characteristic curves, 30
- characteristic triangle, 94
- characteristics, 46
- closed sets, 13
- closure, 13
- compact set, 14
- compactly supported functions, 56
- complete normed space, 194
- complete metric space, 38
- complete orthogonal set, 192
- completion, 69
- constant coefficient PDE, 6
- continuous map in metric spaces, 12
- continuous map in normed spaces, 10
- contraction mapping, 38
- convergence, 3
- convergence of distributions, 61
- convolution, 123

- d'Alembert's solution, 87
- damped wave equation, 110
- degenerate PDE, 83
- delta distribution, 59
- dense subspace, 188
- density of test functions, 62
- differentiable function, 4
- directional derivative, 29
- Dirichlet boundary conditions, 8
- Dirichlet kernel, 215
- disk, 173
- distance function, 12
- distribution, 58
- distributional derivatives, 63
- domain of dependence, 93
- domain of influence, 95
- dual vector space Z^* of Z , 249
- Duhamel's principle, 160

- eigenvalue, 188
- eigenvalue equation, 171
- eigenvector, 188
- elliptic operator, 146
- elliptic regularity, 146
- elliptic second order PDE, 84
- energy conservation, 98
- energy estimate, 104

- entropy condition, 77
 equivalent norms, 3
 Euler-Lagrange equation, 23
 Euler-Lagrange functional, 21
 even extension, 149

 Fejér kernel, 220
 finite speed of propagation, 109
 fixed point, 38
 Fourier cosine basis, 190
 Fourier cosine series, 190
 Fourier inversion formula, 114
 Fourier sine basis, 189
 Fourier sine series, 190
 Fourier transform \mathcal{F} , 114
 Fourier transform of tempered distributions, 137
 full Fourier basis, 190
 full Fourier series, 190, 203
 full symbol of PDE, 117
 fully non-linear PDE, 7
 fundamental solution, 144

 generalized Fourier coefficients, 192
 generalized Fourier series, 187
 Gram-Schmidt orthogonalization, 198
 Green's function, 144

 standard H^1 -norm, 251
 the space $H^1(\Omega)$, 253
 the space $H_0^1(\Omega)$, 253
 heat equation, 6
 heat kernel, 123
 Helmholtz equation, 118
 Hermitian symmetry, 179
 Hilbert space, 248
 homogeneous boundary condition, 8
 homogeneous linear PDE, 6
 Huygens' principle, 95
 hyperbolic second order PDE, 84

 induced metric, 12
 inhomogeneous boundary condition, 8
 inhomogeneous linear PDE, 6
 initial conditions, 8
 inner product, 179
 integral curve, 29
 interior, 13
 invariant subspace, 264
 inverse Fourier transform \mathcal{F}^{-1} , 114

 the space $L^1(\mathbb{R}^n)$, 70
 the space $L^2(\Omega)$, 195

 the space ℓ^2 , 181
 Laplace's equation, 6
 Laplace-Beltrami operator, 26
 least squares, 193
 Lebesgue integral, 71
 left inverse, 246
 limit points, 13
 linear map, 2
 linear PDE, 6
 Lipschitz map, 41
 locally convex space, 248

 matrix transpose, 82
 maximum principle, 100
 Maxwell's equations, 19
 mean value property, 212
 method of images, 153
 metric, 12
 metric space, 12
 min-max for eigenvalues, 274
 multiindex notation, 5

 Neumann boundary conditions, 8
 non-characteristic initial value problem, 32
 norm, 2

 odd extension, 148
 odd periodic extension, 156
 open sets, 13
 orthocomplement, 259
 orthogonal projection to line, 184
 orthogonal projection to subspace, 258
 orthogonal set of vectors, 187
 overdetermined problem, 127

 parallelogram law, 196
 Parseval/Plancherel formula, 141
 partial derivative, 5
 partial Fourier transform, 121
 partition of unity, 74
 periodic boundary conditions, 219
 phase function, 236
 Poincaré inequality, 106
 pointwise convergence, 201
 Poisson formula, 212
 Poisson kernel, 213
 positive definite, 180
 propagation of singularities, 96
 Pythagoras' theorem, 183

 quasilinear PDE, 7

-
- Radon transform, 132
 - Rankine-Hugoniot jump condition, 76
 - rarefaction wave, 77
 - Rayleigh quotient, 265
 - rectangle, 177
 - reflection of singularities, 155
 - Rellich's lemma, 268
 - Riesz' lemma, 255
 - right inverse, 246
 - Robin boundary conditions, 110

 - Schrödinger equation, 131
 - Schwartz functions, 116
 - sector, 177
 - semilinear PDE, 7
 - separation of variables, 169
 - sequential continuity, 12
 - sesquilinear map, 182
 - shock wave, 76
 - singular support, 95
 - Sobolev space, 253
 - spectral methods, 171
 - stationary phase, 237
 - stationary points, 237
 - subsequence, 14
 - support, 56
 - symmetric operator, 188

 - Taylor's theorem, 15
 - tempered distribution, 135
 - test functions, 57
 - torus, 197
 - transpose operator, 65
 - trial functions, 67
 - triangle inequality, 3

 - ultrahyperbolic second order PDE, 84
 - uniform convergence, 201
 - uniform with all derivatives
 - convergence, 201
 - uniformly continuous map, 14

 - wave equation, 6
 - weak solution, 65
 - weak-* topology, 61
 - Weierstrass M-test, 202
 - Weyl's law, 274

 - X-ray transform, 126