

# Contents

<b>Contents of Volumes I and II</b> .....	xi
---	----

<b>Preface</b> .....	xiii
----------------------	------

<b>13 Function Space and Operator Theory for Nonlinear Analysis</b> .....	1
1 $L^p$ -Sobolev spaces .....	2
2 Sobolev imbedding theorems .....	4
3 Gagliardo–Nirenberg–Moser estimates .....	8
4 Trudinger’s inequalities .....	14
5 Singular integral operators on $L^p$ .....	17
6 The spaces $H^{s,p}$ .....	24
7 $L^p$ -spectral theory of the Laplace operator .....	31
8 Hölder spaces and Zygmund spaces .....	40
9 Pseudodifferential operators with nonregular symbols .....	50
10 Paradifferential operators .....	60
11 Young measures and fuzzy functions .....	74
12 Hardy spaces .....	86
A Variations on complex interpolation .....	96
References .....	102
<b>14 Nonlinear Elliptic Equations</b> .....	105
1 A class of semilinear equations .....	107
2 Surfaces with negative curvature .....	119
3 Local solvability of nonlinear elliptic equations .....	127
4 Elliptic regularity I (interior estimates) .....	135
5 Isometric imbedding of Riemannian manifolds .....	147
6 Minimal surfaces .....	152
6B Second variation of area .....	168
7 The minimal surface equation .....	176
8 Elliptic regularity II (boundary estimates) .....	185
9 Elliptic regularity III (DeGiorgi–Nash–Moser theory) .....	196
10 The Dirichlet problem for quasi-linear elliptic equations .....	208
11 Direct methods in the calculus of variations .....	222
12 Quasi-linear elliptic systems .....	229
12B Further results on quasi-linear systems .....	244
13 Elliptic regularity IV (Krylov–Safonov estimates) .....	258

14	Regularity for a class of completely nonlinear equations.....	273
15	Monge–Ampere equations .....	282
16	Elliptic equations in two variables .....	294
A	Morrey spaces .....	299
B	Leray–Schauder fixed-point theorems .....	302
	References .....	304
<b>15</b>	<b>Nonlinear Parabolic Equations .....</b>	<b>313</b>
1	Semilinear parabolic equations .....	314
2	Applications to harmonic maps .....	325
3	Semilinear equations on regions with boundary .....	332
4	Reaction-diffusion equations.....	335
5	A nonlinear Trotter product formula.....	353
6	The Stefan problem.....	362
7	Quasi-linear parabolic equations I .....	376
8	Quasi-linear parabolic equations II (sharper estimates) .....	387
9	Quasi-linear parabolic equations III (Nash–Moser estimates) ....	396
	References .....	407
<b>16</b>	<b>Nonlinear Hyperbolic Equations .....</b>	<b>413</b>
1	Quasi-linear, symmetric hyperbolic systems .....	414
2	Symmetrizable hyperbolic systems .....	425
3	Second-order and higher-order hyperbolic systems.....	432
4	Equations in the complex domain and the Cauchy– Kowalewsky theorem.....	445
5	Compressible fluid motion .....	448
6	Weak solutions to scalar conservation laws; the viscosity method	457
7	Systems of conservation laws in one space variable; Riemann problems.....	472
8	Entropy-flux pairs and Riemann invariants.....	498
9	Global weak solutions of some $2 \times 2$ systems .....	509
10	Vibrating strings revisited .....	517
	References .....	524
<b>17</b>	<b>Euler and Navier–Stokes Equations for Incompressible Fluids .....</b>	<b>531</b>
1	Euler’s equations for ideal incompressible fluid flow.....	532
2	Existence of solutions to the Euler equations .....	542
3	Euler flows on bounded regions .....	553
4	Navier–Stokes equations .....	561
5	Viscous flows on bounded regions.....	575
6	Vanishing viscosity limits .....	586
7	From velocity field convergence to flow convergence .....	599
A	Regularity for the Stokes system on bounded domains .....	605
	References .....	610

<b>18</b>	<b>Einstein's Equations</b>	615
1	The gravitational field equations	616
2	Spherically symmetric spacetimes and the Schwarzschild solution	626
3	Stationary and static spacetimes	639
4	Orbits in Schwarzschild spacetime	649
5	Coupled Maxwell–Einstein equations	656
6	Relativistic fluids	659
7	Gravitational collapse	670
8	The initial-value problem	677
9	Geometry of initial surfaces	687
10	Time slices and their evolution	699
	References	705
	<b>Index</b>	711

Partial Differential Equations III

Nonlinear Equations

Taylor, M.

2011, XXII, 715 p., Hardcover

ISBN: 978-1-4419-7048-0