
Contents

	Introduction	1
1	Preliminaries	7
1.1	Sobolev Spaces	7
1.2	Saddle Point Problems	10
1.3	Finite Element Spaces	14
1.4	Projection Operators	18
1.5	Quasi Interpolation Operators	22
2	Stability Results	25
2.1	Piecewise Linear Elements	34
2.2	Dual Finite Element Spaces	41
2.3	Higher Order Finite Element Spaces	44
2.4	Biorthogonal Basis Functions	48
3	The Dirichlet–Neumann Map for Elliptic Boundary Value Problems	53
3.1	The Steklov–Poincaré Operator	56
3.2	The Newton potential	61
3.3	Approximation by Finite Element Methods	63
3.4	Approximation by Boundary Element Methods	66
4	Mixed Discretization Schemes	71
4.1	Variational Methods with Approximate Steklov–Poincaré Operators	72
4.2	Lagrange Multiplier Methods	78
5	Hybrid Coupled Domain Decomposition Methods	85
5.1	Dirichlet Domain Decomposition Methods	87
5.2	A Two-Level Method	94
5.3	Three-Field Methods	97

5.4	Neumann Domain Decomposition Methods	103
5.5	Numerical Results	109
5.6	Concluding Remarks	114
References		117