

Cambridge University Press

0521574919 - Perturbation of the Boundary in Boundary-Value Problems of Partial  
Differential Equations

Dan Henry

Table of Contents

[More information](#)

## Contents

	<b>Introduction</b>	<i>page</i> 1
<b>1</b>	<b>Geometrical Preliminaries</b>	3
1.1	Some notation	3
<b>2</b>	<b>Differential Calculus of Boundary Perturbations</b>	18
<b>3</b>	<b>Examples Using the Implicit Function Theorem</b>	27
3.1	Torsional Rigidity	27
3.2	Simple Eigenvalues of the Dirichlet Problem for the Laplacian	32
3.3	Capacity	36
3.4	Green's Function	39
3.5	Simple Eigenvalues of Robin's Problem	40
3.6	Simple Eigenvalue of a General Dirichlet Problem	44
<b>4</b>	<b>Bifurcation Problems</b>	46
4.1	Multiple Eigenvalues of the Dirichlet Problem for the Laplacian	46
4.2	Variation of a Turning Point	51
4.3	A Bifurcation Problem with Two-Dimensional Kernel	53
4.4	Generic Simplicity of Eigenvalues of a Self-Adjoint $2m$ -Order Dirichlet Problem	55
<b>5</b>	<b>The Transversality Theorem</b>	60
<b>6</b>	<b>Generic Perturbation of the Boundary</b>	79
6.1	Generic Simplicity of Eigenvalues of the Dirichlet Problem for $\Delta$	80

Cambridge University Press

0521574919 - Perturbation of the Boundary in Boundary-Value Problems of Partial  
Differential Equations

Dan Henry

Table of Contents

[More information](#)

viii	<i>Contents</i>	
6.2	Simplicity of Eigenvalues with a Reflection-symmetry Constraint	83
6.3	Simplicity of Real Eigenvalues of a General Second-Order Dirichlet Problem	85
6.4	Generic Simplicity of Eigenvalues for the Neumann Problem for $\Delta$	88
6.5	Generic Simplicity of $\Delta u + f(x, u, \nabla u) = 0$ in $\Omega$ , $u = 0$ on $\partial\Omega$	89
6.6	Generic Simplicity of Eigenvalues of Robin's Problem	94
6.7	Generic Simplicity of Solutions of $\Delta u + f(u, x) = 0$ in $\Omega$ , $\partial u / \partial N = g(k, u)$ on $\partial\Omega$	100
6.8	Generic Simplicity of Complex Eigenvalues of a Dirichlet Problem	106
<b>7</b>	<b>Boundary Operators for Second-Order Elliptic Equations</b>	114
7.1	Weakly Singular Integral Operators with $C_*^r(\alpha)$ Kernels	116
7.2	Integral Equations with $C_*^r(\alpha)$ Kernels	122
7.3	Fourier Transform and Composition of Weakly Singular Kernels	126
7.4	Limits of Singular Integrals	135
7.5	Fundamental Solutions	139
7.6	Calculation of some boundary Operators	141
<b>8</b>	<b>The Method of Rapidly-Oscillating Solutions</b>	152
8.1	Introduction	152
8.2	Formal Asymptotic Solutions	154
8.3	Exact Solutions	158
8.4	Example 6.8 Revisited: Generic Simplicity of Complex Eigenvalues	161
8.5	Generic Simplicity of Solutions of a System	168
Appendix 1	Eigenvalues of the Laplacian in the Presence of Symmetry	183
Appendix 2	On Micheletti's Metric Space	188
	<i>References</i>	199
	<i>Index</i>	203