

Contents

List of Figures	xi
List of Tables	xiii
List of Symbols	xv
List of Abbreviations	xvi
Preface	xvii
1 Introduction	1
1.1 Literature review of GNEPs	3
1.2 Mathematical formulation of GNEP	4
1.2.1 Assumptions	6
1.2.2 Karush-Kuhn-Tucker conditions for GNEP	6
1.2.3 GNEP reformulations: Player convex GNEP	8
1.2.4 GNEP reformulations: Jointly convex GNEP	9
1.3 Motivation and objective of the thesis	12
1.4 Organization of the thesis	14
2 A Globally Convergent Improved BFGS Method for Generalized Nash Equilibrium Problems	17
2.1 Introduction	17
2.2 Motivation	18
2.3 Contributions	19
2.4 Improved BFGS method	19
2.5 Improved BFGS methods to solve GNEPs	25
2.6 Convergence analysis	27
2.7 Numerical Results	38

2.8 Conclusion	45
3 An Inexact Newton Method to Solve Generalized Nash Equilibrium Problems	47
3.1 Introduction	47
3.2 Motivation	48
3.3 Contributions	48
3.4 Inexact Newton method	49
3.4.1 Inexact Newton method of GNEP: player convex case	49
3.4.2 Algorithm: Inexact Newton method for player convex GNEPs .	53
3.4.3 Inexact Newton method of GNEP: jointly convex case	65
3.4.4 Algorithm: Inexact Newton method for jointly convex GNEPs .	66
3.5 Numerical results	68
3.6 Conclusion	75
4 Improved Nonmonotone Adaptive Trust-region Method to solve Generalized Nash Equilibrium Problems	77
4.1 Introduction	77
4.2 Motivation	78
4.3 Contributions	79
4.4 Trust-region framework	79
4.5 INATR method	81
4.6 Convergence Analysis	85
4.7 Application to generalized Nash equilibrium problems	89
4.8 Numerical results	90
4.8.1 Some illustrative examples	93
4.9 Conclusion	96
5 Extended Karush-Kuhn-Tucker Condition for Constrained Interval Optimization Problems and its Application in Support Vector Machines	99
5.1 Introduction	99
5.2 Motivation	100
5.3 Contributions	101
5.4 Fundamentals of intervals and interval-valued functions	101
5.4.1 Interval arithmetic	101
5.5 Fritz John and Karush-Kuhn-Tucker optimality conditions	108
5.5.1 Unconstrained interval optimization problems	114

5.5.2	Interval optimization problem with inequality constraints	117
5.5.3	Comparison with existing KKT conditions for IOPs	125
5.6	Application to Support Vector Machines	126
5.6.1	Comparison with existing solutions to interval uncertainty in SVM	130
5.7	Conclusion	132
6	Conclusion and future directions	133
6.1	General conclusions	133
6.2	Contribution of the thesis	133
6.3	Future directions	135
References		138
List of Publications		149