Tamaki TANAKA, Dr. Sci.

Professor
Program: Fundamental Sciences
Area: Mathematical Science
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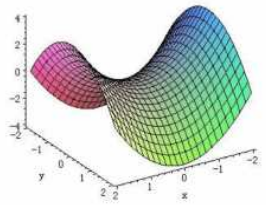
Professional Expertise

His research Expertise is convex analysis, nonlinear analysis, game theory, vector optimization and set-valued analysis. Especially, he developed a framework of vector-valued minimax problems and proved saddle-point existence theorems and several types of minimax inequality results. Moreover, he has introduced a framework of multicriteria game whose payoff takes its values in an ordered vector space, and drawn each image set of payoff functions in the game by using computational programs. Recently, he and his group have developed nonlinear scalarization methods for set-valued maps, and proved inherited properties on convexity and semi-continuity. Also, his group is concerned with Operations Research (OR) including vector optimization and global optimization.

Saddle point of a convex-concave function



Research Fields of Interest

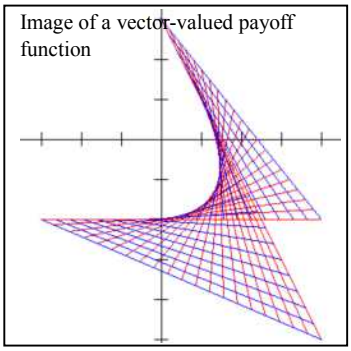
Minimax theory for vector-valued functions and set-valued maps

- Study on generalization of classical minimax theory like minimax theorems and saddle-point theorems for vector-valued and/or set-valued cases.

Multicriteria game theory

- Study on generalization of classical game theory for vector-valued and/or set-valued cases and image-analysis of vector-valued payoffs.

Image of a vector-valued payoff function



Generalized Inequalities for set-valued maps

- Study on generalization of classical inequalities (like Fan-Takahashi inequality, Ricceri's inequality) into set-valued map in an abstract ordered vector space.

Generalizations of convexity and semicontinuity for functions

- Study on general convexity and semicontinuity for vector-valued and set-valued functions in an abstract ordered vector space.

Set-valued optimization

- Study on optimization problems with set-valued objective function, and inherited properties on convexity and semicontinuity through sublinear scalarization functions.

Multiobjective equilibrium problems

- Study on general equilibrium problems with vector-valued and/or set-value functions, including optimization problems, fix-point problems, variational inequalities, and complementarity problems.

Global optimization algorithms

- Study on computational algorithms to solve global optimal solutions for mathematical programming problems.

Education

1992: Doctor of Sci.degree, Grad. School (Math.), Niigata University, Japan
1986: Master of Sci.degree, Grad. School (Math.), Niigata University, Japan (1984-1986)
1984: Bachelor of Sci.degree, Dept.of Mathematics, Niigata University, Japan (1980-1984)

Professional Societies and Activities

1. Member, the Mathematical Society of Japan
2. Member, the Operations Research Society of Japan
3. Board and working committee member, the Pacific Optimization Research Activity Group (POP)
4. Steering committee member, the International Research Working Group in Nonlinear Analysis and Convex Analysis (NACA)
5. Editor of Journal of Nonlinear and Convex Analysis (refereed international journal, Yokohama)
6. Associate Editor of Nihonkai Mathematical Journal (refereed international journal, Niigata University)

Major Publications

Papers

[1] "On generalization of Ricceri's theorem for Fan-Takahashi minimax inequality into set-valued maps via scalarization," J. Nonlinear Convex Anal., 16 (1), 9-19, (2015), (with Y.Saito and S.Yamada).

[2] "On Lusin's theorem for non-additive measures that take values in an ordered topological vector space," Fuzzy Sets and Systems, 244, 41-50 (2014), (with T.Watanabe).

[3] "Admissibility for positive continuous-time descriptor systems," Internat. J. Systems Sci. 44(11), 2158-2165 (2013), (with Youmei Zhang, Qing Ling Zhang, and M.Cai).

[4] "Relationships between vector-valued cone-dc and locally cone-dc functions," J. Math.Anal.Appl., 398, 588-593 (2013), (with S.Yamada and T.Tanino).

[5] "Optimality condition for vector-valued DC programming problems," J. Nonlinear Convex Anal., 13(1), 57-64 (2012), (with M.Hojo and S.Yamada).

[6] "Continuity of cone-convex functions," Optimization Letters, 6, 1847-1853 (2012), (with I.Kuwano).

[7] "Unified scalarization for sets and set-valued Ky Fan minimax inequalities," J. Nonlinear Convex Anal., 11(3), 513-525 (2010), (with I.Kuwano and S.Yamada).

[8] "Characterization of nonlinear scalarizing functions for set-valued maps," Nonlinear Analysis and Optimization, 193-204, Yokohama Publishers (2009), (with I.Kuwano and S.Yamada).

[9] "Minimal element theorem with set-relations," J. Nonlinear Convex Anal., 9, 249-253 (2008), (with A.Shimizu).

[10] "On generalizing Caristi's fixed point theorem," Nonlinear Analysis and Convex Analysis, 4, 41-46, Yokohama Publ. (2007), (with Y.Araya).

[11] "Optimality conditions in set-valued optimization using nonlinear scalarization methods," Nonlinear Analysis and Convex Analysis, 4, 565-574, Yokohama Publ. (2007), (with A.Shimizu and S.Nishizawa).

[12] "Alternative theorems for set-valued maps based on a nonlinear scalarization," Pac. J. Optim., 1, 147-159 (2005), (with S.Nishizawa and M.Onodsuka).

[13] "Classification of matrices by means of envelopes for bicriteria matrix games," Int. J. Math. Game Theory Algebra, 12, 371-378 (2002), (with M.Higuchi).

[14] "On vector equilibrium problems: remarks on a general existence theorem and applications," Nihonkai Math. J., 12, 149-164 (2001), (with E.M.Kalmoun and H.Riahi).

[15] "Vector-valued set-valued variants of Ky Fan's inequality," J. Nonlinear Convex Anal., 1,245-254 (2000), (with P.G.Georgiev).

[16] "On cone convexity of set-valued maps," Nonlinear Anal., 30, 1487-1496 (1997), (with D.Kuroiwa and T.X.D.Ha).

[17] "Generalized Semicontinuity and Existence Theorems for Cone Saddle Points," Appl. Math.Optim., 36, 313-322 (1997).

[18] "Multistage games with vector payoffs," Nova J. Math. Game Theory Algebra, 6, 97-102 (1996), (with L.A.Petrosjan).

[19] "Approximately efficient solutions in vector optimization," Journal of Multi-Criteria Decision Analysis, 5,271-278, (1996).

[20] "Generalized quasiconvexities, cone saddle points, and minimax theorem for vector-valued functions," J.Optim.Theory Appl., 81, 355-377 (1994).

[21] "The convexity of A and B assures int $A + B$ = int$(A + B)$," Appl. Math. Lett., 6, 83-86 (1993), (with D.Kuroiwa).

[22] "Two types of minimax theorems for vector-valued functions," J.Optim.Theory Appl., 68, 321-334 (1991).

[23] "Existence theorems for cone saddle points of vector-valued functions in infinite-dimensional spaces," J.Optim.Theory Appl., 62, 127-138, (1989).

[24] "Some minimax problems of vector-valued functions," J.Optim.Theory Appl., 59, 505-524, (1988)

Book Chapters

[1] Y.Shi and M.Zeleny eds., New Frontiers of Decision Making for the Information Technology Era, World Scientific, Singapore, 2000, pp.75-99 (Chapter 5).