Dedicated to Professor Yeol Je Cho on the occasion of his retirement

Levitin-Polyak well-posedness for parametric quasivariational inclusion and disclusion problems

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ABSTRACT.

In this paper, we aim to suggest the new concept of Levitin-Polyak (for short, LP) well-posedness for the parametric quasivariational inclusion and disclusion problems (for short, (QVIP) (resp. (QVDP))). Necessary and sufficient conditions for LP well-posedness of these problems are proved. As applications, we obtained immediately some results of LP well-posedness for the quasiequilibrium problems and for a scalar equilibrium problem.

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REFERENCES

- Anh, L. Q. and Khanh, P. Q., Semicontinuity of the solution sets of parametric multivalued vector quasiequilibrium problems, J. Math. Anal. Appl., 294 (2004), 699–711
- [2] Anh, L. Q., Khanh, P. Q. and My Van, D. T., Well-posedness without semicontinuity for parametric quasiequilibria and quasioptimization, Comput. Math. Appl., 62 (2011), 2045–2057
- [3] Anh, L. Q., Khanh, P. Q. and Quy, D. N., About Semicontinuity of Set-valued Maps and Stability of Quasivariational Inclusions, Set-Valued. Var. Anal., 22 (2014), 533–555
- [4] Aubin, J. P. and Ekeland, I., Applied Nonlinear Analysis, Wiley, New York (1984)
- [5] Ceng, L. C., Hadjisavvas, N., Schaible S. and Yao, J. C., Well-posedness for mixed quasivariational-like inequalities, J. Optim. Theor. Appl., 139 (2008), 109–225
- [6] Ceng, L. C. and Yao, J. C., Well-posedness of generalized mixed variational inequalities, inclusion problems and fixed point problems, Nonlinear. Anal. TMA, 69 (2008), 4585–4603
- [7] Chen, J. W., Cho, Y. J., Khan, S. A., Wan, Z. and Wen, C. F., The Levitin-Polyak well-posedness by perturbations for systems of general variational inclusion and disclusion problems, Indian J. Pure Appl. Math., 46 (2015), No. 6, 901–920
- [8] Chen, J. W., Wan, Z. and Cho, Y. J., Levitin-Polyak well-posedness by perturbations for systems of set-valued vector quasi-equilibrium problems, Math. Method. Operat. Research., 77 (2013), 33–64
- [9] Crespi, G. P., Guerraggio, A. and Rocca, M., Well-posedness in vector optimization problems and vector variational inequalities, J. Optim. Theor. Appl., 132 (2007), 213–226
- [10] Fang, Y. P., Huang, N. J., and Yao, J. C. Well-posedness of mixed variational inequalities, inclusion problems and fixed point problems, J. Global Optim., 41 (2008), 117–133
- [11] Huang, X. X. and Yang, X. Q., Gereralized LevitinPolyak well-posedness in constrained optimization, SIAM J. Optim., 17 (2006), 243–258
- [12] Ioffe, A. and Lucchetti, R. E., Typical convex program is very well-posed, Math. Program. Series B., 104 (2005), 483–499

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- [13] Ioffe, A., Lucchetti, R. E. and Revalski, J. P., Almost every convex or quadratic programming problem is well-posed, Math. Oper. Res., 29 (2004), 369–382
- [14] Kuratowski, K., Topology, vols. 1, 2. Academic Press, New York (1968)
- [15] Levitin, E. S. and Polyak, B. T., Convergence of minimizing sequences in conditional extremum problem, Sov. Math. Dokl., 7 (1966), 764–767
- [16] Li, Q. Y. and Wang, S. H., Well-posedness for parametric strong vector quasi-equilibrium problems with applications, Fixed Point Theory Appl., 62 (2011), 14pp.
- [17] Lignola, M. B., Well-posedness and L-well-posedness for quasivariational inequalities, J. Optim. Theor. Appl., 128 (2006), 119–138
- [18] Lignola, M. B. and Morgan, J., α-well-posedness for Nash equilibria and for optimization problems with Nash equilibrium constraints, J. Global Optim.,36 (2006), 439–459
- [19] Lin, L. J. and Chuang, C. S., Well-posedness in the generalized sense for variational inclusion and disclusion problems and well-posedness for optimization problems with constraint, Nonlinear Anal. TMA, 70 (2009), 3609–3617
- [20] Margiocco, M., Patrone, F. and Pusillo Chicco, L., A new approach to Tikhonov well-posedness for Nash equilibria, Optim., 40 (1997), 385–400
- [21] Morgan, J. and Scalzo, V., Discontinuous but well-posed optimization problems, SIAM J. Optim., 17 (2006), 861–870
- [22] Petrus, A., Rus, I. A. and Yao, J. C., Well-posedness in the generalized sense of the fixed point problems for multivalued operators, Taiwanese J. Math., 11 (2007), NO. 3, 903–914
- [23] Revalski, J. P., Hadamard and strong well-posedness for convex programs, SIAM J. Optim., 7 (1997), 519–526
- [24] Tykhonov, A. N., On the stability of the functional optimization problem, USSRJ. Comput. Math. Phys., 6 (1966), 631–634
- [25] Yimmuang, P. and Wangkeeree, R., Well-posedness by perturbations for the hemivariational inequality governed by a multi-valued map perturbed with a nonlinear term, Pac. J. Optim., **12** (2016), No. 1, 119–131
- [26] Wang, S. H. and Huang, N. J., Levitin-Polyak Well-posedness for generalized quasi-variational inclusion and disclusion problems and optimization problems with constraints, Taiwanese J. Math., 16 (2012), 237–257
- [27] Wang, S., Huang, N. and O'Regan, D., Well-posedness for generalized quasi-variational inclusion problems and for optimization problems with constraints, J. Global Optim., 55 (2013), 189–208
- [28] Wang, S. H., Huang, N. J. and Wong, M.M., Storng levitin-polyak well-posedness for generalized quasivariational inclusion problems with applications, Taiwanese J. Math., 16 (2012), No. 2, 665–690
- [29] Wangkeeree, R., Anh, L. Q. and Boonman, P., Well-posedness for general parametric quasi-variational inclusion problems, Optim., 66 (2016), 93–111
- [30] Wangkeeree, R. Bantaojai, T. and Yimmuang, P. Well-posedness for lexicographic vector quasiequilibrium problems with lexicographic equilibrium constraints, J. Math. Anal. Appl., 163 (2015), DOI 10.1186/s13660-015-0669-5
- [31] Zolezzi, T. On well-posedness and conditioning in optimization, ZAMM-J. Appl Math. and Mech., 84 (2004), 435–443
- [32] Zolezzi, T., Condition number theorems in optimization, SIAM J. Optim., 14 (2003), 507-516

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