Penalty method in the study of elliptic variational inequalities

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We consider a class of elliptic variational inequalities in a reflexive Banach space for which we recall a convergence criterion obtained in [1]. Each inequality in the class is governed by a set of constraints and has a unique solution. The criterion provides necessary and sufficient conditions which guarantee that an arbitrary sequence converges to the solution. Then, we consider a sequence of unconstrained variational-hemivariational inequalities governed by a sequence of positive parameters. We use our criterion to deduce that, the sequence of solutions to these inequalities converges to the solution of the considered variational inequality when the sequence of parameters tends to zero.

The talk is based on the join work [2] with Piotr Bartman-Szwarc (Poland), Mircea Sofonea (France) and Domingo Tarzia (Argentina).

[1] C. Gariboldi, A. Ochal, M. Sofonea and D. Tarzia, A convergence criterion for elliptic variational inequalities, Applicable Analysis, 103 (2024), 1810-1830, doi:10.1080/00036811. 2023.2268636.

[2] P. Bartman-Szwarc, A. Ochal, M. Sofonea, D. Tarzia, A new penalty method for elliptic variational inequalities, Discrete and Continuous Dynamical Systems B., 30(11) (2025), 4206-4225, doi:10.3934/dcdsb.2025021

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