Parabolic Variational and Quasi-Variational Inequalities with Gradient Constraints

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A class of nonlinear parabolic quasi-variational inequality (QVI) problems with gradient type constraints in function space is considered. Problems of this type arise, for instance, in the mathematical modelization of superconductors and elasto-plasticity. The paper addresses existence, regularity and approximation results based on monotone operator theory, Mosco convergence and $C_0$ semigroup methods. Numerical tests involving the $p$-Laplacian operator with several nonlinear constraints are provided.