Implicit Euler scheme for an abstract evolution inequality

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Abstract

For a triple {V, H, V*} of Hilbert spaces, we consider an evolution inclusion of the form u′(t)+A(t)u(t)+δφ{symbol}(t, u(t)) ∋f(t), u(0) = u0, t ∈ (0, T], where A(t) and φ{symbol}(t, ·), t ∈ [0, T], are a family of nonlinear operators from V to V * and a family of convex lower semicontinuous functionals with common effective domain D(φ{symbol}) ⊂ V. We indicate conditions on the data under which there exists a unique solution of the problem in the space H1(0, T; V)∩W∞ 1 (0, T;H) and the implicit Euler method has first-order accuracy in the energy norm. © 2011 Pleiades Publishing, Ltd.