

Daniel Wachsmuth

The regularity of the positive part of functions in $L^2(I; H^1(\Omega)) \cap H^1(I; H^1(\Omega)^)$ with applications to parabolic equations*

Comment.Math.Univ.Carolin. 57,3 (2016) 327 –332.

Abstract: Let $u \in L^2(I; H^1(\Omega))$ with $\partial_t u \in L^2(I; H^1(\Omega)^*)$ be given. Then we show by means of a counter-example that the positive part u^+ of u has less regularity, in particular it holds $\partial_t u^+ \notin L^1(I; H^1(\Omega)^*)$ in general. Nevertheless, u^+ satisfies an integration-by-parts formula, which can be used to prove non-negativity of weak solutions of parabolic equations.

Keywords: Bochner integrable function; projection onto non-negative functions; parabolic equation

AMS Subject Classification: 46E35, 35K10

REFERENCES

- [1] Gajewski H., Gröger K., Zacharias K., *Nichtlineare Operatorgleichungen und Operatordifferentialgleichungen*, Akademie-Verlag, Berlin, 1974.
- [2] Grün G., *Degenerate parabolic differential equations of fourth order and a plasticity model with non-local hardening*, Z. Anal. Anwendungen **14** (1995), no. 3, 541–574.
- [3] Roubíček T., *Nonlinear Partial Differential Equations with Applications*, International Series of Numerical Mathematics, 153, Birkhäuser, Basel, 2013.
- [4] J. Wloka J., *Partielle Differentialgleichungen*, Teubner, Stuttgart, 1982.