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DISPLACEMENT SOLUTIONS FOR TIME DISCRETIZATION AND EVOLUTION PROBLEM RELATED TO MINIMAL SURFACES AND PLASTICITY: EXISTENCE, UNIQUENESS AND REGULARITY IN THE ONE-DIMENSIONAL CASE

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Introduction. This paper is devoted to the existence and uniqueness for some evolution equation of elliptic type, when the data, and the second member are in $W^{1,1}$ (and for special boundary conditions). A model problem is the evolution equation for minimal surfaces,

$$u_t - \operatorname{div}\Big(\frac{\nabla u}{\sqrt{1+|\nabla u|^2}}\Big) = f.$$

But we present also the case of plasticity and other examples coming from physics.

In a basic article of R. Temam [17], the author presented an abstract result for the evolution equation of minimal surfaces

$$\begin{cases} u_t - \operatorname{div}\big(\frac{\nabla u}{\sqrt{1+|\nabla u|^2}}\big) = f \\ u_{|\partial\Omega} = g, \quad u(0) = u_0 \end{cases} \tag{0.1}$$

in a very weak sense. The process employed was an abstract one, based upon the theory of semigroups.

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