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TO L^1 -THEORY OF NONLINEAR FOURTH-ORDER EQUATIONS WITH A STRENGTHENED ELLIPTICITY

In the talk we give some recent results in the investigation of the Dirichlet problem for nonlinear fourth-order equations with a strengthened ellipticity and L^1 -right-hand sides. Different kinds of solutions to this problem (entropy solutions, H -solutions and W -solutions) were introduced and studied in [1]. Generally speaking, entropy solutions (defined by a family of integral inequalities) and H -solutions (defined by an integral identity) do not belong to Sobolev spaces, while W -solutions (defined by an integral identity) lie in the Sobolev space $W^{2,1}$.

Our new results are connected with a modification of the notion of entropy solution. We call this modification a proper entropy solution. We state theorems on the existence, uniqueness and integrability of proper entropy solutions. The existence of these solutions is established without the use of an important condition required in [1] for the existence of entropy solutions. At the same time under the mentioned condition any proper entropy solution is an entropy solution. We also show that any proper entropy solution is an H -solution and under some condition on the parameters involved is a W -solution. Finally, we deal with generalized solutions (i.e. solutions in the corresponding energy Sobolev space) in the case of sufficiently regular right-hand sides of the equations under consideration. Any generalized solution is a proper entropy solution. We describe conditions on the data of the problem under which any proper entropy solution is a generalized solution.

The results stated will appear in [2].

- [1] Kovalevskii A.A. Entropy solutions of the Dirichlet problem for a class of non-linear elliptic fourth-order equations with right-hand sides in L^1 // *Izv. Math* – 2001. – V. 65, no. 2. – P. 231–283.
 - [2] Kovalevsky A.A. Nonlinear fourth-order equations with a strengthened ellipticity and L^1 -data // *On the notions of solution to nonlinear elliptic problems: results and developments*, Quaderni di Matematica, 23. Department of Mathematics, Seconda Università di Napoli, Caserta, 2008 (to appear).
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