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EXISTENCE AND UNIQUENESS OF WEAK SOLUTIONS FOR COMPRESSIBLE ELASTIC CURVES IN THE ENERGY CONSERVATION SYSTEM

Dedicated to Professor Nobuyuki Kenmochi of his 77th birthday.

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Abstract. In this paper, we consider the initial and boundary value problem for the beam equation with the compressible stress function which has the singularity point with respect to the nonlinear strain. This problem is proposed as the mathematical model for representing motions of closed elastic curves on the plane in our previous work. We have already shown the existence and uniqueness of weak solutions to the problem with the Lipschitz continuous stress function on $\mathbb{R}$. We have also proved the existence and uniqueness of weak solutions and strong solutions to the problem with the viscosity term and the compressible stress function. Our aim of this paper is to establish a theorem for existence and uniqueness of weak solutions to the energy conservation problem with the compressible stress function. We obtain the weak solution by showing convergence of solutions to the problem with the viscosity term.

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