LAGRANGIAN COORDINATES IN FREE BOUNDARY PROBLEMS FOR PARABOLIC EQUATIONS NOT IN DIVERGENCE FORM

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In this talk we present the method of Lagrangian coordinates in the study of free boundary problems for evolution equations which do not have the form of a conservation law. The method is introduced by the study case of a cross-diffusion system composed of two nonlinear parabolic equations. It is shown that this system admits the so-called segregated solutions (u, v) such that $u + v \geq \delta > 0$ and $u \cdot v = 0$ everywhere in the problem domain. Introduction of Lagrangian coordinates allows one to describe the motion of the interface by means of a differential equation, which generalizes the Darcy law in the theory of filtration.

It is discussed the application of the method to the study of the interface in a degenerate diffusion-absorption equation.