STRUCTURE/REGULARITY OF SOLUTIONS TO SUDDEN DIRECTIONAL DIFFUSION SYSTEMS

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Abstract

Anisotropic systems in class of singular parabolic equations generates unusual structures of solutions. One of the most spectacular phenomena are flat regions of solutions, called by the theory: facets. Such effects are consequences of the very high singularity of the nonlinear elliptic operator. If the system is anisotropic then the shape of the facets is determined by the anisotropy. From that reason such models find naturally a place in the theory of crystal growth and image processing.

The goal of my talk is to present some current results concerning model problems. I plan to consider the mono-dimensional system

$$u_t - L(u_x)_x = 0$$

and $(L(u_x), u_x) \in \mathcal{A}$ with $\mathcal{A}$ – a maximal monotone graph. Fundamental examples are:

$$L_0(p) = sgn\, p \quad \text{and} \quad L_1(p) = p + sgn\, p.$$

For such systems we are able to construct a complete theory explaining the qualitative features of solutions. I plan to present also partial results for two dimensional version of studied systems.