Emergence and evolution of fronts and singular patterns in non-linear diffusion models

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Abstract. In this talk we address the analysis of the qualitative properties of non-linear diffusion operators of flux-saturated type: regularity, evolution of discontinuous interfaces, existence of traveling wave type profiles, speed and waiting times for the growth of the solution support or connections with optimal mass transportation. The objective is to know better and characterize this type of phenomena by focusing on two prototypical operators: the relativistic heat equation and the flux-saturated porous-media equation. In the interphase treatment, we showed that the flux-saturated models behave more closely to the conservation laws than to diffusive models. Finally, some applications are considered in developmental biology concerning the Keller-Segel type models, where we focus on blow-up and on the emergence of singular patterns.