On stabilisation of solutions of singular quasi-linear parabolic equations with singular potentials

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Abstract We consider singular quasi-linear parabolic equations containing Bessel operator and a singular potential. We find a class of (non-classical) well-posed boundary-value problems for those equations and a necessary and sufficient condition of the stabilisation of their solutions.

1. Introduction

It is well-known that for singular differential equations problems with *weighted boundary-value conditions* are well-posed. For example, a classical boundary-value condition for equations of principal type containing Bessel operator is boundedness (in the neighbourhood of the hyperplane of singularity) of the solution multiplied to the power function (see 6 and references therein); the power of the weight is entirely defined by the parameter at the singularity of Bessel operator. If, however, a parabolic equation contains low-order terms (even regular ones), then the situation is changed - a condition linking the weighted solution and its normal derivative on the same hyperplane (hereafter called *special* hyperplane) becomes well-posed (while their weights are still defined by the same parameter).

In this paper we consider the case where the coefficient at the zero-order term (hereafter called potential) has a singularity (at the same hyperplane) while the equation contains so-called non-linearity of Burgers-Kardar-Parisi-Zhang type (see e. g. 3, 4) with a singular non-linear coefficient. It turns out in that case the weighted boundary-value con-

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