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Nonlinear Venttsel problems

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ABSTRACT

We review the recent results for the one- and two-phase elliptic and parabolic boundary value problems with Venttsel type conditions. Such problems describe various physical processes in media containing a thin film of a material having higher permeability.

If a thin film covers the boundary surface then we deal with the one-phase Venttsel problem. The boundary condition in that case is given by an equation of the second order with the principal term being a parabolic (elliptic) operator in tangential variables and with nontangential first order term.

If a thin film separates a medium into two parts then we are concerned with the two-phase Venttsel problem. The condition on the interface in that case is specified by an equation of the second order with the principal term being a parabolic (elliptic) operator in tangential variables and with the first order term being a "jump"-operator across the separating film.

For these problems we formulate some statements concerning a-priori estimates and the existence theorems in Sobolev and Hölder spaces. It should be especially noted that all statements are obtained under the equally general assumptions as for the classical boundary value problems.

Keywords: *Venttsel conditions, elliptic equations, parabolic equations, a-priori estimates*

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