

Remarks on a Unilateral Problem Associated to a Scalar Conservation Law

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Abstract

Some hydrological models require a unilateral constraint on the saturation that is subject to be below (or above) a certain threshold. When the threshold value is attained a free boundary arises and divides the flow domain into two regions not a priori known. After reviewing some known results on the corresponding obstacle problem for first order quasilinear equations with several independent variables, we extend the Lewy-Stampacchia inequalities and we give a nondegeneracy condition in order to obtain a stability property of the saturation region with respect to variation of the data. A strict nondegeneracy assumption yields a local estimate of the variation of the characteristic functions of the respective saturation regions.