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Some new monotonicity theorems with applications to free boundary problems. (English)

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This paper is devoted to some new monotonicity theorems with applications to free boundary problems. More precisely, the authors reformulate the theorem so that it applies to inhomogeneous equations in which the right-hand side of the equation need not vanish at the free boundary. Here particular interest is the case in which Δu takes two different constant values on the set where $u > 0$ and on the set where $u < 0$. The new versions of the monotonicity theorem presented in the paper lead to existence of certain classical solutions to the Prandtl-Batchelor equation in two dimensions and partial regularity results in higher dimensions.

Reviewer: [Messoud A. Efendiev \(Berlin\)](#)

MSC:

[35J25](#) Boundary value problems for second-order elliptic equations

[35B65](#) Smoothness and regularity of solutions to PDEs

[35R35](#) Free boundary problems for PDEs

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