# A rigidity result for overdetermined elliptic problems in the plane

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**Abstract**

A widely open problem is to classify the set of domains $\Omega \subset \mathbb{R}^n$ where there exists a bounded solution $u$ to the overdetermined elliptic problem

$$\begin{cases} \Delta u + f(u) = 0 & \text{in } \Omega \\ u > 0 & \text{in } \Omega \\ u = 0 & \text{on } \partial\Omega \\ \frac{\partial u}{\partial \overrightarrow{\nu}} = 1 & \text{on } \partial\Omega \end{cases} \tag{1}$$

for some Lipschitz function $f$. The case of a bounded domain was solved by J. Serrin in 1971: the ball is the unique such domain. Instead, the case of unbounded domains is not yet completely understood.

In this talk we show that if $n = 2$ and $\partial\Omega$ is unbounded and connected, then $\Omega$ is a halfplane. This is joint work with Antonio Ros (U. Granada) and Pieralberto Sicbaldi (U. Aix Marseille).

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