A non standard unique continuation property related to Schiffer conjecture.

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Coming from a control problem for a coupled fluid-structure system we are confronted to the following problem in dimension 2:

$$\Delta^2 w = -\lambda \Delta w \quad \text{in } \Omega \tag{1}$$

$$w = \frac{\partial w}{\partial n} = 0 \quad \text{on } \Gamma \tag{2}$$

$$\frac{\partial \Delta w}{\partial n} = 0 \quad \text{on } \Gamma_0 \subset \Gamma. \tag{3}$$

The question is : do we have $w = 0$?

There is a counterexample when Ω is a disc. The analogous of (local) Schiffer's conjecture is : is the disc the only domain for which we can have a non zero solution?

Notice that the term local means that the additional boundary condition occurs only on a part of the boundary and when this boundary is not analytic, this is a major difference.

A sub-conjecture would be : when the boundary is not analytic, do we have $w = 0$?

Here we show that when Ω has a corner of angle θ_0 with $\theta_0 \neq \pi, 3\frac{\pi}{2}$ and when Γ_0 is (locally) one edge of this angle then the only solution is $w = 0$.