Dirichlet problem in a domain with a small hole

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We consider a Dirichlet problem in a domain with a small hole of diameter proportional to a real parameter ϵ and we denote by u_ϵ the corresponding solution. We show that the behavior of u_ϵ for ϵ small and positive can be described in terms of real analytic operators. Then, it will be natural to ask what happens when the parameter ϵ becomes negative. The answer to this question reveals some interesting aspect of the problem. In particular, we have completely different phenomena depending on the parity of the dimension of the ambient space. The original results exposed are obtained in collaboration with Paolo Musolino (IRMAR, Rennes, France).