# A NEW METHOD FOR THE INVERSE POTENTIAL PROBLEM BASED ON THE TOPOLOGICAL DERIVATIVE CONCEPT

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**Resumo/Abstract:**
The inverse potential problem consists in reconstructing an unknown measure with support in a geometrical domain from a single boundary measurement. In order to deal with this severely ill-posed inverse problem, we rewrite it as an optimization problem where a Kohn-Vogelius-type functional measuring the misfit between the solutions of two auxiliary problems is minimized. One auxiliary problem contains information on the boundary measurement while the other one corresponds to the boundary excitation. The solutions of the auxiliary problems coincide once the inverse problem is solved. In order to minimize the Kohn-Vogelius criterion, we apply the so-called topological derivative concept, which measures the sensitivity of a given shape functional with respect to an infinitesimal singular domain perturbation. In particular, we propose a new method for solving the inverse potential problem based on the first and second order topological derivatives considering partial boundary measurement. Finally, some numerical results are presented in order to show the effectiveness of the devised reconstruction algorithm.