

EQUIVALENT CONDITIONS FOR EXISTENCE OF THREE SOLUTIONS FOR A PROBLEM WITH DISCONTINUOUS AND STRONGLY-SINGULAR TERMS

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In this work, we are concerned with a Kirchhoff problem in the presence of a strongly-singular term perturbed by a discontinuous nonlinearity of the Heaviside type in the setting of Orlicz-Sobolev space. The presence of both strongly-singular and non-continuous terms bring up difficulties in associating a differentiable functional to the problem with finite energy in the whole space $W_0^{1,\Phi}(\Omega)$. To overcome this obstacle, we established an optimal condition for the existence of $W_0^{1,\Phi}(\Omega)$ -solutions to a strongly-singular problem, which allows us to constrain the energy functional to a subset of $W_0^{1,\Phi}(\Omega)$ to apply techniques of convex analysis and generalized gradient in Clarke sense.