

# Periodic solutions to second-order indefinite singular equations

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## Abstract

The efficient conditions guaranteeing the existence of a  $T$ -periodic solution to the second order differential equation

$$u'' = h(t)g(u)$$

are established. Here,  $g$  is a positive and decreasing function which has a strong singularity at the origin, and the weight  $h \in L(\mathbb{R}/T\mathbb{Z})$  is a sign-changing function. The obtained results have the form of relation between the multiplicities of the zeroes of the weight function  $h$  and the order of the singularity of the nonlinear term. The approach is based on Leray-Schauder degree theory, proving that no  $T$ -periodic solution of a certain homotopy appears on the boundary of an unbounded open set during the deformation to an autonomous problem.

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