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Periodic solutions of damped differential systems with repulsive singular forces. (English)

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Summary: The author considers the periodic boundary value problem for the singular differential system $u'' + (\nabla F(u))' + \nabla G(u) = h(t)$, with $F \in C^2(\mathbb{R}^N, \mathbb{R})$, $G \in C^1(\mathbb{R}^N \backslash \{0\}, \mathbb{R})$, and $h \in L^1([0,T], \mathbb{R}^N)$. The singular potential $G(u)$ is of repulsive type in the sense that $G(u) \to +\infty$ as $u \to 0$. Under Habets-Sanchez's strong force condition on $G(u)$ at the origin, the existence results, obtained by coincidence degree in this paper, have no restriction on the damping forces $(\nabla F(u))'$. Meanwhile, some quadratic growth of the restoring potentials $G(u)$ at infinity is allowed.

MSC:

34C15 Nonlinear oscillations and coupled oscillators for ordinary differential equations
34C25 Periodic solutions to ordinary differential equations

Keywords:

singular force; strong force condition; damped system; coincidence degree

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