

Multiple Solutions of Dirichlet Boundary Value Problems in Billiard Spaces

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This is a joint work with Věra Krajščáková (Palacký University, Olomouc, Czech Republic).

We have investigated a Dirichlet problem in one-dimensional billiard space

$$\begin{aligned}x'' &= f(t, x, x') \quad \text{if } x(t) \in \text{int } K, \\x'(t+) &= -x'(t-) \quad \text{if } x(t) \in \partial K, \\x(0) &= A, \quad x(T) = B,\end{aligned}$$

where $T > 0$, $K = [0, R] \subset \mathbb{R}$, $R > 0$, f is a Carathéodory function on $[0, T] \times K \times \mathbb{R}$, $A, B \in \text{int } K$. We have found sufficient conditions for the existence of solutions having prescribed number of impacts with the boundary. Unlike the previous works [1, 2, 3, 4, 5], the right hand of the differential equation depends on the derivative of a solution.

References

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