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This is a joint work with Věra Krajščáková (Palacký University in Olomouc, Czechia).

We 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 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 the solution. The results have been found especially for linear and sublinear growth of the right hand side in the last variable.

References

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