

Méthodes topologiques en analyse non linéaire:développements récents -
Conférence à la mémoire du Professeur Andrzej Granas
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Topological Methods in Nonlinear Analysis: Recent Advances - Conference
in memory of Professor Andrzej Granas
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Gabor Grzegorz
(Nicolaus Copernicus University)

On two-point BVPs in billiard spaces

In the talk the two-point second order boundary value problem $\ddot{x}(t) = f(t, x(t))$, $x(0) = A$, $x(T) = B$ in an n -dimensional polyhedron K with absolutely elastic impacts on the boundary of K will be discussed. We call such set K , where solutions move and bounce off the boundary, a *billiard space*. Note that standard billiard problems can be modelled by a simple equation $\ddot{x}(t) = 0$. Hence the problems we are interested in can be described as a study of a movement of a ball on an uneven ‘table’ (n -dimensional). We shall focus on the existence and multiplicity of solutions, especially having first impacts only at $(n - 1)$ -dimensional faces of K . As a main tool the unfolding technique will be used for such spaces to reformulate the problem into a non-impulsive problem on \mathbb{R}^n and to apply the Schauder fixed point theorem in this unfolded situation. As an illustration of the unfolding method and main results, the model of a system of two colliding balls on uneven ground is presented.

Some part of results presented in the talk will be published in Journal of Fixed Point Theory and Applications (the paper accepted).