Sobolev, A. S.

A proof of the Dirac conjecture for a class of finite-dimensional Hamilton-Dirac systems.

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Math. Notes 71, No. 5, 724-729 (2002); translation from Mat. Zametki 71, No. 5, 793-797 (2002).

This paper is devoted to constrained Hamiltonian systems. By definition constraints in a neighborhood of a point $x_0 \in \mathbb{E}$ is a map $\phi : \mathbb{E} \to \mathbb{E}_\phi$ satisfying the following conditions:

a) ϕ is continuously differentiable in a neighborhood of the point x_0 and $\phi(x_0) = 0$;

b) the map $\phi'(x_0) : \mathbb{E} \to \mathbb{E}_\phi$ is surjective.

Here $\mathbb{E}, \mathbb{E}_\phi$ are the Euclidean spaces. A Dirac Hamiltonian system on the phase space $\mathbb{E}$ is a set $(H, \phi, \mathbb{E}, I)$, where $H \in C^\infty(\mathbb{E}, R^1)$, $\phi : \mathbb{E} \to \mathbb{E}_\phi$ is a constraint, $\mathbb{E}$ is an even-dimensional Euclidean space, and $I : \mathbb{E} \to \mathbb{E}$ is a symplectic operator. The author introduces the Dirac class, and within this class proves the classical Dirac conjecture. The proof is based on the theory of control systems.

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MSC:

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70Q05 Control of mechanical systems

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Dirac class; phase space; symplectic operator; control system; constrained Hamiltonian system

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