International Conference
on Partial Differential Equations and Applications
in Memory of Professor B. Yu. Sternin
Moscow, Russia, November 6–9, 2018

ABSTRACTS

RUDN University,
Moscow State University,
Ishlinsky Institute for Problems in Mechanics RAS

Moscow
2018

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М43 **Международная конференция по дифференциальным уравнениям с частными производными и приложениям, посвящённая памяти профессора Б.Ю. Стернина. Москва, Россия, 6–9 ноября 2018 г.** : тезисы докладов = **International Conference on Partial Differential Equations and Applications in Memory of Professor B.Yu. Sternin. Moscow, Russia, 6–9 November 2018** : abstracts. – Москва : РУДН, 2018. – 79 с.

Конференция посвящена памяти профессора Бориса Юрьевича Стернина (1939–2017). Научная программа включает доклады по разным разделам теории дифференциальных уравнений с частными производными и их приложениям, которыми занимался проф. Б.Ю. Стернин. В работе конференции принимают участие ведущие российские и зарубежные специалисты, а также его коллеги, ученики и соавторы.

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Phase flow over 0-singularity

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The problem under discussion arose when the author offered the construction of one-dimensional double pendulum with special type of constraint [1]. The configuration space of this pendulum consists of two smooth lines in tangency. This situation means a geometrical uncertainty for trajectories of the motion equation. The series of experiments showed that there is no dynamical uncertainty [2]. Trajectories of motion always cross each other. However, absolutely unexpected was the fact that the lines has non zero curvature at the tangency point and the real trajectories on the state-space are not C^2-smooth. So the adequate mathematical model is needed to explain this phenomenon.

We offer the geometrical model of special embedding of vector bundle over singular manifold in $\mathbb{R}^3$. Consider the equation in $\mathbb{R}^3$

$$y^2 - \left(zx + \operatorname{sign}(x) x^2 e^{z \ln |x|}\right)^2 = 0.$$

1. For any section $x = \text{const}$ its components of connectedness are homeomorphic to $\mathbb{R}$. Hence, this manifold has natural structure of one-dimensional vector bundle.

2. All sections $z = \text{const} \neq 0$ are two transversal lines.

3. The section $z = 0$ is the base of bundle and is the lines in tangency of 1-order.

So, even a trajectory is smooth its projection on the base is not C^2-smooth. Now we can apply to this geometrical model different approaches to build the differential calculus over the base for modeling the above mechanical system.

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