Udmurt State University
Mathematical Institute SANU (Belgrade)
Steklov Mathematical Institute RAS (Moscow)
Journal "Regular and Chaotic Dynamics"
Russian Foundation of Basic Research

Sixth International Conference

"Geometry, Dynamics, Integrable Systems – GDIS 2016"

Book of Abstracts

2–5 June 2016

Izhevsk, Russia

The conference “Geometry, Dynamics, Integrable Systems – GDIS 2016” is being held under the auspices of the Russian Foundation for Basic Research (16-01-20252).

Sixth International Conference “Geometry, Dynamics, Integrable Systems – GDIS 2016”: Book of abstracts. — Moscow–Izhevsk: Publishing Center “Institute of Computer Science”, 2016. — 70 p.

ISBN 978-5-4344-0361-0

Bifurcation analysis of a 2D rigid circular cylinder interacting dynamically with a point vortex in the absence of circulation

Sergey V. Sokolov[1], Sergey M. Ramodanov[2] and Pavel E. Ryabov[1,3]

[1] *Institute for Machines Science RAS, Moscow, Russia*
[2] *Institute for Cryptosystems, Communications and Informatics, Moscow, Russia*
[3] *Financial University under Government of the Russian Federation, Moscow, Russia*

We consider the dynamics of a system that consists of a circular cylinder interacting with a vortex filament parallel to the cylinder's element in an unbounded volume of ideal fluid. The fluid is assumed to be incompressible and at rest at infinity. The governing equations were first obtained in [1], while the Hamiltonian form of the equations and their Liouville integrability was established in [2]. In the gravity field this system was studied in [3] where it was shown to exhibit chaotical behavior and therefore be no longer integrable.

The paper [4] addresses the topology of the integrable system (a cylinder plus a single vortex). The fluid's circulation about the cylinder was assumed to be different from zero. However, it was specially noted that the case of zero circulation needs a thorough separate treatment.

Thus, this contribution is devoted to the case of zero circulation. We have obtained new intriguing invariant relations, built up the bifurcation diagram and explored bifurcations of the Liouville tori.

The work is supported by the grants of RFBR Nos. 16-01-00170 and 16-01-00809.

References

[1] Ramodanov S. M. *Motion of a circular cylinder and a vortex in an ideal fluid*. Regular and Chaotic Dynamics, 2001, vol. 6, no. 1, pp. 33–38.

[2] Borisov A. V., Mamaev I. S. *Integrability of the Problem of the Motion of a Cylinder and a Vortex in an Ideal Fluid* // Math. Notes, 2004, vol. 75, no. 1, pp. 19–22.

[3] Sokolov S. V., Ramodanov S. M. *Falling motion of a circular cylinder interacting dynamically with a point vortex* // Regular and Chaotic Dynamics, 2013, vol. 18, nos. 1-2, pp. 184–193

[4] Borisov A. V., Ryabov P. E., Sokolov S. V. *Bifurcation analysis of the Problem of Motion of a Cylinder and a Vortex in an Ideal Fluid* // Math. Notes, 2016, vol. 99, no. 6, pp. 848–854