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Geometry and dynamics of isorotational and iso-harmonic deformations

Friday, July 2, 2021 3:20 PM (40 minutes)

The talk is based on a strong interrelation between integrable billiards and Poncelet polygons, extremal polynomials, Riemann surfaces, potential theory, and isomonodromic deformations. We discuss injectivity properties of rotation and winding numbers. We construct and describe isorotational families of Poncelet polygons inscribed in a given circle and subscribed about conics from a confocal family. After introducing a new notion of iso-harmonic deformations, we study their isomonodromic properties in the first nontrivial examples and indicate the genesis of a new class of the so-called constrained isomonodromic deformations. The talk is based on the work in progress with Vasilisa Shramchenko and:

1. V. Dragovic, M. Radnovic, Periodic ellipsoidal billiard trajectories and extremal polynomials, Communications. Mathematical Physics, 2019, Vol. 372, p. 183-211.
2. V. Dragovic, V . Shramchenko, Algebro-geometric solutions of the Schlesinger systems and the Poncelet-type polygons in higher dimensions, International Math. Research Notices, 2018, Vol. 2018, No 13, p. 4229-4259.
3. V. Dragovic, V. Shramchenko, Algebro-geometric approach to an Okamoto transformation, the Painleve VI and Schlesinger equations, Annales Henri Poincare, 2019, Vol. 20, No. 4, 1121–1148.
4. V. Dragovic, V. Shramchenko, Deformation of the Zolotarev polynomials and Painleve VI equations, Letters Mathematical Physics, 111, 75 (2021). https://doi.org/10.1007/s11005-021-01415-z.
5. V. Dragovic, M. Radnovic, Poncelet polygons and monotonicity of rotation numbers: iso-periodic confocal pencils of conics, hidden traps, and marvels, arXiv: 2103.01215.
6. G. Andrews, V. Dragovic, M. Radnovic, Combinatorics of the periodic billiards within quadrics, arXiv: 1908.01026, The Ramanujan Journal, DOI: 10.1007/s11139-020-00346-y.

Primary author: Prof. DRAGOVIC, Vladimir (University of Texas at Dallas)

Co-author: SHRAMCHENKO, Vasilisa (University of Sherbook)

Presenter: Prof. DRAGOVIC, Vladimir (University of Texas at Dallas)