INTERNATIONAL BIWEEKLY ONLINE SEMINAR ON ANALYSIS, DIFFERENTIAL EQUATIONS AND MATHEMATICAL PHYSICS

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

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On a homothety conjecture for convex bodies of flotation: counterexample.

Dmitry Ryabogin, Kent State University, USA

dryabogi@kent.edu

Let K be a convex body in R^2. For every $\theta \in R$ and the corresponding unit vector $e(\theta) = (\cos\theta, \sin\theta)$ and for every $t \in R$, define the half-planes

$$W^+(\theta,t) = \{x\colon \langle x, e(\theta)\rangle \geq t\} \quad \text{and} \quad W^-(\theta,t) = \{x\colon \langle x, e(\theta)\rangle \leq t\}.$$

If $0 < \mathcal{D} < 1/2$, then for every $\theta \in R$, there is a unique $t(\theta)$ such that

$$\mathrm{vol}_2\big(W^+(\theta,t(\theta)) \cap K\big) = \mathcal{D}\,\mathrm{vol}_2(K).$$

The corresponding convex body of flotation $K^{\mathcal{D}}$ is defined as

$$K^{\mathcal{D}} = \bigcap_{\theta\in R} W^-\big(\theta,t(\theta)\big).$$

We investigate the homothety conjecture for convex bodies of flotation of planar domains. We show that there is a density close to $\frac{1}{2}$ for which there is a body K different from an ellipse with the property that $K^{\mathcal{D}}$ is homothetic to K.

*Seminar website: https://msrn.sfedu.ru/sl. The seminar uses Microsoft Teams online platform.
Please send questions to ademp.seminar@gmail.com (Tatiana Andreeva, scientific secretary).

The seminar is organized by the coordinators Alexey Karapetyants and Vladislav Kravchenko within the activities of the Regional Mathematical Center of the Southern Federal University in collaboration with Institute of Mathematics, Mechanics and Computer Sciences of the Southern Federal University and the OTHA research group in Operator Theory and Harmonic Analysis.

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