BILINEAR BOCHNER-RIESZ MEANS FOR CONVEX DOMAINS AND KAKEYA MAXIMAL FUNCTION

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Abstract:

The study of bilinear Bochner-Riesz means has become an active area of research in harmonic analysis in recent years. The bilinear Bochner-Riesz means of index $\lambda > 0$ associated with the unit disc is the bilinear multiplier operator defined by

$$\mathcal{B}^{\lambda}(f,g)(x) = \int_{\mathbb{R}^{2n}} (1 - |\xi|^2 - |\eta|^2)_+^{\lambda} \hat{f}(\xi)\hat{g}(\eta) e^{2\pi i x\cdot(\xi+\eta)} \, d\xi d\eta.$$

The study of L^p-estimates for the operator $\mathcal{B}^{\lambda}$ was initiated by Bernicot and Germain (2013). Exploiting the symbol $(1 - |\xi|^2 - |\eta|^2)_+^{\lambda}$ and relying on the results for the linear Bochner-Riesz operators, the range of the boundedness for B^{λ} were improved by Jeong and Lee (2020) and later, by Kaur and Shrivastava (2022).

In this talk, we generalize the notion of bilinear Bochner-Riesz means in the context of open and bounded convex domains in the plane $\mathbb{R}^2$ and obtain their L^p-bounds. We note that the previous methods employed in the case of unit disc does not extend to the general case. Instead, we rely on the classical approach of using the Kakeya maximal functions to prove L^p-boundedness results for Fourier multipliers to the bilinear setting. In this regard, we introduce the bilinear Kakeya maximal function in the plane and study its L^p-boundedness properties.
(This is a joint work with Surjeet Singh Choudhary and Saurabh Shrivastava.)