Estimations of oscillatory integrals with convex phases

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Abstract

In the talk, we discuss the estimates of multiple oscillatory integrals

\[ I_s := \int_M u(x)e^{i\lambda f(x)} \, dx, \quad x = (x_1, \ldots, x_s) \in \mathbb{R}^s, \quad M \subset \mathbb{R}^s, \quad \lambda \geq 1, \quad \Im f \equiv 0 \]

Concerning the phase-function \( f \) it is presumed that it is piece-wise convex up or down along rays which emanate from a singular point. The latter is defined as such a point \( x_0 \) that the magnitude of the difference \( |f(x) - f(x_0)| \) is convex down. The amplitude function \( u \) is assumed to be Hölder continuous along the same rays. The results obtained improve the known estimates of the classical Pearcey integrals.

Asymptotic of the integral with the polynomial phase made it possible to obtain a general estimate from below the integrability exponent of the singular integral in the multi-variate analog of Tarry’s problem.