Meeting: 1003, Atlanta, Georgia, SS 27A, AMS-SIAM Special Session on Analysis and Applications in Nonlinear Partial Differential Equations, I

1003-42-615 **Xiaochun Li*** (xcli@ias.edu), School of Mathematics, IAS, Princeton, NJ 08540. *On multilinear oscillatory integrals.*

Let $v_1, v_2, \cdots, v_{n+1}$ be vectors in $\mathbb{R}^{k+1}$. And let $Q(\mathbf{x})$ be a polynomial. We call $Q(\mathbf{x})$ degenerate with respect to $v_1, v_2, \cdots, v_{n+1}$ if

$$Q(\mathbf{x}) = \sum_{j=1}^{n+1} P_j(\mathbf{x} \cdot v_j)$$

for some one-dimensional polynomial $P_1, \cdots, P_{n+1}$.

Consider the form

$$\Lambda_\lambda(f_1, f_2, \cdots, f_{n+1}) = \int_{\mathbb{R}^{k+1}} e^{\lambda Q(\mathbf{x})} \varphi(\mathbf{x}) \prod_{j=1}^{n+1} f_j(\mathbf{x} \cdot v_j) d\mathbf{x}\,,$$

where φ is a standard bump function.

When $n \leq 2k$ and the vectors v_j are in general position (that is, any $k+1$ vectors in $\{v_1, v_2, \cdots, v_{n+1}\}$ are linearly independent), then we have

$$|\Lambda_\lambda(f_1, \cdots, f_{n+1})| \leq C\lambda^{-\varepsilon} \prod_{j=1}^{n+1} \|f_j\|_2 \tag{1}$$

for all non-degenerate polynomials Q and some $\varepsilon > 0$. Furthermore, the bound is uniform over all compact collections of non-degenerate polynomial Q.

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