1150-14-13 **Yifei Pan*** (pan@pfw.edu), Purdue University Fort Wayne, Fort Wayne, IN 46814. *Is Lojasiewicz gradient inequality sharp?*

Let f be a real analytic function in a neighborhood of the origin such that $f(0) = 0, \nabla f(0) = 0$. Then there are constant $C > 0$ and β ($\frac{1}{2} \leq \beta < 1$) such that for x near origin, we have

$$|\nabla f(x)| \geq C|f(x)|^{\beta}$$

This is so called the Lojasiewicz gradient inequality for real analytic functions. A simple question is: How sharp is the inequality in any sense? By Integrating over the inequality we have

$$\int_{\{f\neq 0\}} \left|\frac{\nabla f(x)}{f(x)}\right|^d \geq C^d \int_{\{f\neq 0\}} \frac{1}{|f|^{(1-\beta)d}}.$$

In this talk, we will prove that the left hand side integral is always infinite, and on the other hand, the right hand side integral could be finite in general using a recent geometric proof Lojasiewicz inequalities by P. Feehan. It is this phenomenon that we conclude the Lojasiewicz gradient inequality is not necessarily sharp in L^d sense.

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