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Wenxiong Chen* (wchen@yu.edu), Department of Mathematics, Yeshiva University, 500 W. 185 St., New York, NY 10033, and **Congming Li**. *A sup + inf inequality for a semilinear elliptic equation*. Preliminary report.

In establishing the a priori estimates for the semi-linear elliptic equation $-\Delta u = R(x)e^u$ in R^2 , Brezis, Li, and Shafrir obtained the following inequality

$$\sup_K u + \inf_{\Omega} u \leq C,$$

where Ω is a domain in R^2 and K is a compact subset of Ω . They assumed that $R(x)$ is positive and bounded away from zero.

This inequality has become a powerful tool in estimating the solutions of semi-linear elliptic equations either in Euclidean spaces or on Riemannian manifolds.

We use the method of moving spheres to extend this inequality to the case where $R(x)$ may have zeros. We also illustrate how this inequality can be applied to obtain a priori estimates for the solutions of prescribing Gaussian and scalar curvature equations where the curvature function is allowed to change signs. (Received August 28, 2006)