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[Keynote Talk]: Applying p-Balanced Energy Technique to Solve Liouville-Type Problems in Calculus

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Abstract : We are interested in solving Liouville-type problems to explore constancy properties for maps or differential forms on Riemannian manifolds. Geometric structures on manifolds, the existence of constancy properties for maps or differential forms, and energy growth for maps or differential forms are intertwined. In this article, we concentrate on discovery of solutions to Liouville-type problems where manifolds are Euclidean spaces (i.e. flat Riemannian manifolds) and maps become real-valued functions. Liouville-type results of vanishing properties for functions are obtained. The original work in our research findings is to extend the q-energy for a function from finite in L^q space to infinite in non-L^q space by applying p-balanced technique where q = p = 2. Calculation skills such as Hölder's Inequality and Tests for Series have been used to evaluate limits and integrations for function energy. Calculation ideas and computational techniques for solving Liouville-type problems shown in this article, which are utilized in Euclidean spaces, can be universalized as a successful algorithm, which works for both maps and differential forms on Riemannian manifolds. This innovative algorithm has a far-reaching impact on research work of solving Liouville-type problems in the general settings involved with infinite energy. The p-balanced technique in this algorithm provides a clue to success on the road of q-energy extension from finite to infinite.

Keywords : differential forms, holder inequality, Liouville-type problems, p-balanced growth, p-harmonic maps, q-energy growth, tests for series
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