Variational theory for the resonant prescribed Q-curvature equation

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Abstract

In this talk, we will present a variational theory for the resonant prescribed Q-curvature equation on closed 4-dimensional Riemannian manifolds. Precisely, under a nondegeneracy condition, we will show how the refined bubbling analysis of some natural *variational* vanishing viscosity solutions leads to the characterization of the critical points at infinity of the associated variational problem via the establishement of a Morse Lemma at infinity, and the compactness of the equation via a Chen-Lin exact bubbling rate formula. Moreover, we will show how the latter Chen-Lin exact bubbing rate formula leads naturally to existence results under a Positive Mass type assumption, and that how when combined with the Morse Lemma at infinity they provide a formula for the Leray-Schauder degree of the resonant prescribed Q-curvature equation, and hence providing Bahri-Coron and Chang-Yang Poincarè-Hopf index type formula for existence. We will show also how the strength of the Morse Lemma at infinity gives K. C. Chang and Malchiodi-Struwe system type existence results. Finally, we will explain how to use the Morse Lemma at infinity and Conley theory to develop algebraic topological arguments for existence à la Bahri-Coron, even if the Paneitz functional does not verify the quantization property like the Yamabe functional.

[1]Part of the talk is a joint work with Mohameden Ahmedou of the University of Giessen.