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Variational approach to the steady Generalized Kähler-Ricci solitons

This talk concerns Generalized Kähler-Ricci solitons (GKRS) - geometric structures independently arising in the context of supersymmetric sigma models, generalized geometry of Hitchin and Gualtieri, uniformization problems in non-Kähler geometry and Einstein-Weyl geometry. GKRS are natural generalizations of Ricci-solitons, incorporating a torsion term.

Every Generalized Kähler (GK) structure on a smooth manifold M admits an infinitesimal variation parametrized by $C^\infty(M, R)/R$. Integrating such infinitesimal variations we obtain a notion of GK class, and it makes sense to study existence and uniqueness questions for GKRS in a given class. Following the fundamental ideas in Kähler geometry, we define a weighted J-functional on the GK class of a log-nondegenerate GK manifold. This functional naturally extends the Aubin' functional in Kähler geometry, and J -functional of Apostolov and Streets in nondegenerate GK setting. We prove that a log-nondegenerate GK structure is a critical point for the weighted J-functional if and only if it is a gradient steady GKRS. We use this functional to prove rigidity of solitons in a given GK class, and use the latter to deduce complete classification of compact GKRS for $\dim M = 4$ (joint with V.Apostolov and J.Streets)