Stanfield, James
Positive Hermitian curvature flow on nilpotent and almost-abelian complex Lie groups. (English)

The main result concerns the limiting behaviour of the positive Hermitian curvature flow $HCF_+$ on nilpotent Lie groups equipped with left-invariant Hermitian metrics. The author describes the precise asymptotic behaviour of appropriately normalised solutions, proving convergence to an $HCF_+$-soliton on a simply-connected, complex nilpotent Lie group. An $HCF_+$-soliton is a Hermitian manifold with corresponding solution that is self-similar. More precisely, the solution evolves only by scaling and pull-back by time-dependent biholomorphisms. Laurèt’s bracket flow technique is employed in the proof of the result. Here, the key steps in the analysis all involve viewing the bracket flow as the gradient flow of a certain functional coming from real geometric invariant theory. A key result is needed concerning the torsion-twisted Chern-Ricci tensor. The author also describes the long-time behaviour in a class of 2-step solvable Lie groups; specifically, almost-abelian complex Lie groups, proving convergence to a steady $HCF_+$-soliton. Here Laurèt’s bracket flow is used with a suitable monotone quantity. The final result addresses the existence and uniqueness of $HCF_+$-solitons on almost-abelian Lie groups. The proof of this result is constructive and thus yields examples of $HCF_+$-solitons in arbitrary dimensions.

Reviewer: Gabriela Paola Ovando (Rosario)

MSC:
53E30 Flows related to complex manifolds (e.g., Kähler-Ricci flows, Chern-Ricci flows)
53C15 General geometric structures on manifolds (almost complex, almost product structures, etc.)
22E25 Nilpotent and solvable Lie groups

Keywords:
geometric flows; Hermitian geometry; nilpotent and solvable Lie groups; $HCF_+$-soliton; bracket flow

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References:


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