

Harmonic flow of Spin(7)-structures

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Abstract. We formulate and study the isometric flow of Spin(7)-structures on compact 8-manifolds, as an instance of the harmonic flow of geometric structures. Starting from a general perspective, we establish Shi-type estimates and a correspondence between harmonic solitons and self-similar solutions for arbitrary isometric flows of H -structures. We then specialise to $H = \text{Spin}(7) \subset \text{SO}(8)$, obtaining conditions for long-time existence, via a monotonicity formula along the flow, which leads to an ε -regularity theorem. Moreover, we prove Cheeger-Gromov and Hamilton-type compactness theorems for the solutions of the harmonic flow, and we characterise Type-I singularities as being modelled on shrinking solitons. We also establish a Bryant-type description of isometric Spin(7)-structures, based on squares of spinors, which may be of independent interest.

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