

**Título:** SOLITONES ASOCIADOS A ESTRUCTURAS GEOMÉTRICAS Y FORMAS DE KILLING

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**Departamento:** Geometría y topología

**Fecha de lectura:** 28/03/2014

**Mención a doctor europeo:** concedido

**Programa de doctorado:** Matemáticas

**Dirección:**

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**Descriptores:**

- > GEOMETRIA DE RIEMANN
- > GEOMETRIA DIFERENCIAL

**El fichero de tesis** ya ha sido incorporado al sistema

- > 2014seoansolit.pdf

**Localización:** BIBLIOTECA XERAL DA USC

**Resumen:** We will consider pseudo-Riemannian manifolds (in particular Riemannian and Lorentzian manifolds) equipped with certain additional structures which are induced by differential equations of geometric evolution (the equation of Yamabe soliton and the equation of Cotton soliton) or by certain tensorial equations defined on the tangent bundle of the manifold (equations of the Cotton tensor in dimension three and equations of an almost complex structure of nearly Kähler type in dimension six).

Yamabe and Cotton solitons, as geometric fixed points of the Yamabe and of the Cotton flow, are defined by a system of differential equations and hence our interest focuses both in the construction of new solutions and in understanding the underlying structure of those Lorentzian manifolds which support them, with the aim of getting geometric characterizations in each case.

The study of the curvature tensor in the three-dimensional case is simplified by the fact of being completely determined by the Ricci tensor of the manifold since the Weyl tensor is identically zero. Moreover, the fact that the Weyl tensor vanishes implies that the Cotton tensor plays its role in the characterization of locally conformally flat manifolds. We will pay attention to the study of non locally conformally flat pseudo-Riemannian manifolds whose Cotton tensor is parallel with the aim to obtain a geometric characterization of them. Moreover, we will study other Einstein-like condition for the Cotton tensor: manifolds whose Cotton tensor is cyclic parallel and manifolds whose Cotton tensor is Codazzi.

Yamabe solitons with constant scalar curvature and Ricci solitons are directly related with Ricci collineations and with 1-harmonic vector fields, respectively. We will pay a special attention to these kind of vector fields in the homogeneous case. Both of them can be considered as generalizations of Killing vector fields. There exist different generalizations of Killing vector fields, as for example Killing forms. In the literature the study of Killing forms is related to the existence of certain algebraic structures on the manifold, as for example on Kähler manifolds. Motivated by this fact, special attention will be also paid to the study of the existence of Killing forms on nearly Kähler non Kähler manifolds of dimension six.