No periodic orbits for the Einstein-Yang-Mills equations

Claudio A. Buzzi

(in collaboration with Jaume Llibre)

Departamento de Matemática, UNESP - Universidade Estadual Paulista, 15054-000–São José do Rio Preto, Brazil

E-mail: buzzi@ibilce.unesp.br
URL: http://www.mat.ibilce.unesp.br/sisdin

The static, spherically symmetric Einstein-Yang-Mills equations with a cosmological constant $a \in \mathbb{R}$ are

$$\begin{aligned} &\dot{r} = rN, \\ &\dot{W} = rU, \\ &\dot{N} = (k-N)N - 2U^2, \\ &\dot{k} = s(1-2ar^2) + 2U^2 - k^2, \\ &\dot{U} = sWT + (N-k)U, \\ &\dot{T} = 2UW - NT, \end{aligned} \tag{1}$$

where $(r, W, N, k, U, T) \in \mathbb{R}^6$, $s \in \{-1, 1\}$ refers to regions where t is a time-like respectively space-like, and the dot denotes a derivative with respect to t. See for instanced [1] and the references quoted therein for additional details on these equations.

The physicists are mainly interested in the solutions of the differential system (1) with $r > 0$, see the middle of the page 573 of [1].

In this work we proved that system (1) has no periodic solutions when $r > 0$.

References

[1] P. Breitenloher, B. Forgács and D. Maison, *Classification of static, spherically symmetric solutions of the Einstein-Yang-Mills theory with positive cosmological constant*, Comm. Math. Phys. **261** (2006), 569–611.