

Ricci-Bourgoignon Flow on Contact Manifolds

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Extended Abstract

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Introduction

After pioneering work of Hamilton in 1982, Ricci flow and other geometric flows became as one of the most interesting topics in both mathematics and physics. In the present paper, firstly, we summarize some introductory concepts about contact manifolds. Then, the notion of Ricci-Bourgoignon flow as a generalization of Ricci and Yamabe flows is introduced. Using De Turck vector field, the equation of Ricci-Bourgoignon flow has been reduced to another equation which its linearization is a strictly parabolic partial differential equation. According to theory of partial differential equation, we have showed that for $\rho < \frac{1}{2}$ and a given initial condition the Ricci-Bourgoignon flow has a unique solution for a short time. Finally, we show that every solution of Ricci-Bourgoignon flow on a closed (compact without boundary) contact manifold is self-similar and the corresponding soliton is steady.

Material and methods

In this scheme, first we summarized some basic concepts on contact manifolds. Then, equation of Ricci-Bourgoignon flow on contact manifolds is introduced. Using De Turck vector field and theory of PDE's, short time existence and uniqueness solution for such equation is obtained.

Results and discussion

We obtained a condition for which Ricci-Bourgoignon flows with initial condition have a unique solution for a short time. Also, our results show that every solution of Ricci-Bourgoignon flow on a closed contact manifold is self-similar and the corresponding soliton is steady.

Conclusion

The following conclusions were drawn from this research.

- Short time existence and uniqueness theorem for Ricci-Bourgoignon flow examined in this paper.
- Our results showed that solutions of this equation on a closed contact manifold are self-similar and their corresponding solitons are steady.
- Regardless of the dimension of underlying contact manifold, we showed that for $\rho < \frac{1}{2}$ the Ricci-Bourgoignon flow with given initial condition has a unique solution for a short time.

Keywords: Geometric flow- Soliton- Contact manifold- self-similar solution.

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