

## Riemannian maps whose base manifolds admit a Ricci soliton

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**Abstract.** In this paper, we study Riemannian maps whose base manifolds admit a Ricci soliton, and give a non-trivial example of such a Riemannian map. First, we find the Riemannian curvature tensor for the base manifolds of the Riemannian map  $F$ . Further, we obtain the Ricci tensor and calculate the scalar curvature of the base manifold. Moreover, we obtain necessary conditions for the leaves of  $\text{range } F_*$  to be Ricci soliton, almost Ricci soliton, and Einstein. We also obtain necessary conditions for the leaves of  $(\text{range } F_*)^\perp$  to be Ricci soliton and Einstein. Also, we calculate the scalar curvatures of  $\text{range } F_*$  and  $(\text{range } F_*)^\perp$  by using Ricci soliton. Finally, we study the harmonicity and biharmonicity of such a Riemannian map. We obtain a necessary and sufficient condition for such a Riemannian map between Riemannian manifolds to be harmonic. We also obtain necessary and sufficient conditions for a Riemannian map from a Riemannian manifold to a space form that admits Ricci soliton to be harmonic and biharmonic.

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*Mathematics Subject Classification:* 53B20, 53C25, 53C43.

*Key words and phrases:* Ricci soliton, Einstein manifold, Riemannian map, harmonic map, biharmonic map.

The second author gratefully acknowledges the financial support provided by the Council of Scientific and Industrial Research – Human Resource Development Group (CSIR-HRDG), New Delhi, India (File No.: 09/013(0887)/2019-EMR-I).