

**SOME CURVATURE PROPERTIES AND RICCI SOLITON ON
SASAKIAN MANIFOLD ADMITTING A METRIC CONNECTION**

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ABSTRACT. In this paper we study Ricci solitons on pseudo-projectively flat, quasi-pseudo-projectively flat and quasi-concircularly flat Sasakian manifolds with respect to a new metric connection. Besides these, we study Ricci solitons on some special type of Sasakian manifolds satisfying certain conditions.

REFERENCES

- [1] M. Ahmad, A. Haseeb and J.B. Jun: *Quasi-concircular curvature tensor on a Lorentzian β -Kenmotsu manifold*, J. Chungcheong Math. Soc., **32**(2019), No. 3, 281-293.
- [2] D.E. Blair: *Riemannian Geometry of Contact and Symplectic Manifolds*, Birkhauser, Boston, 2002.
- [3] B.P. Charles and G. Krzysztof: *3-Sasakian manifolds*, Surv. Differ. Geom., **7**(1999), 123-184.
- [4] M.C. Chaki and M. Tarafdar: *On a type of Sasakian manifold*, Soochow J. Math., **16**(1990), No. 1, 23-28.
- [5] M. Dario, James Sparks and Shing-Tung Yau: *Sasaki-Einstein manifolds and volume minimization*, Comm. Math. Phys., **280**(2008), No. 3, 611-673.
- [6] R.S. Hamilton: *Three manifold with positive Ricci curvature*, J. Differential Geom., **17**(1982), No. 2, 255-306.
- [7] R.S. Hamilton: *The Ricci flow on surfaces*, Contemp. Math., **71**(1988), 237-262.
- [8] A. Mandal and A. Das: *On M-projective curvature tensor of Sasakian manifolds admitting Zamkovoy connection*, Adv. Math. Sci. J., **9**(2020), No. 10, 8929-8940.
- [9] A. Mandal and A. Das: *Projective curvature tensor with respect to Zamkovoy connection in Lorentzian para-Sasakian manifolds*, J. Indones. Math. Soc., **26**(2020), No. 3, 369-379.
- [10] A. Mandal and A. Das: *LP-Sasakian manifold equipped with Zamkovoy connection and conharmonic curvature tensor*, J. Indones. Math. Soc., **27**(2021), No. 2, 137-149.
- [11] A. Mandal and A. Das: *Pseudo projective curvature tensor on Sasakian manifolds admitting Zamkovoy connection*, Bull. Calcutta Math. Soc., **112**(2020), No. 5, 431-450.
- [12] H.G. Nagaraja and C.R. Premalatha: *Ricci solitons in Kenmotsu manifolds*, J. Math. Anal., **3**(2012), No. 2, 18-24.
- [13] D. Narain, A. Prakash and B. Prasad: *Quasi-concircular curvature tensor on a Lorentzian para-Sasakian manifold*, Bull. Calcutta Math. Soc., **101**(2009), No. 4, 387-394.
- [14] Z. Olszak: *Certain property of the Ricci tensor on Sasakian manifolds*, Colloq. Math., **40**(1978), No. 2, 235-237.
- [15] B. Prasad: *On pseudo projective curvature tensor on a Riemannian manifold*, Bull. Calcutta Math. Soc., **94**(2002), No. 3, 163-166.
- [16] B. Prasad and A. Mourya: *Quasi-concircular curvature tensor on a Riemannian manifold*, News Bull. Calcutta Math. Soc., **30**(2007), 5-6.

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- [17] Vishnu V. Reddy, S. Sivaramakrishnan and Ramesh Sharma: *Spacetimes through Hawking-Ellis construction with a background Riemannian metric*, Classical Quantum Gravity, **24**(2007), 3339-3345.
- [18] S. Sasaki: *On differentiable manifolds with certain structures which are closely related to almost contact structure*, Tohoku Math. J. (2), **2**(1960), 459-476.
- [19] S. Sasaki: *Almost Contact Manifolds, Part I: A Lecture Note*, Mathematical Institute, Tohoku University, 1965.
- [20] R. Sharma: *Certain results on K -contact and (k, μ) -contact manifolds*, J. Geom., **89**(2008), 138-147.
- [21] M.M. Tripathi: *Ricci solitons in contact metric manifold*, 28 Jan 2008, arXiv:0801.4222v1 [math.D.G.], 9 pages.
- [22] K. Yano and M. Kon: *Structures on Manifolds*, World Scientific Publishing Co., 1984.
- [23] K. Yano: *Concircular geometry I. Concircular transformations*, Proc. Imp. Acad. Tokyo, **16**(1940), 195-200.
- [24] S. Zamkovoy: *Canonical connections on paracontact manifolds*, Ann. Global Anal. Geom., **36**(2008), No. 1, 37-60.

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