J. Adv. Math. Stud.
Vol. **17**(2024), No. 1, 72-79
http://journal.fairpartners.ro

THREE-DIMENSIONAL QUASI-SASAKIAN MANIFOLDS WITH CONFORMAL VECTOR FIELDS AND CONFORMAL RICCI SOLITONS

SUPARNA HALDER, SUBRATA KUMAR DAS AND AVIJIT SARKAR

Abstract. The aim of the present article is to study conformal vector fields and conformal Ricci solitons on three-dimensional quasi-Sasakian manifolds. The orbit of a ϕ-holomorphic conformal vector field on a three-dimensional quasi-Sasakian manifold has been characterized. It is proved that a three-dimensional quasi-Sasakian manifold admitting ϕ-holomorphic conformal vector fields under certain restrictions is Sasakian. It is also established that in a three-dimensional quasi-Sasakian manifold with constant structure function, conformal almost Ricci soliton reduces to conformal Ricci soliton.

REFERENCES

[1] N. Basu and A. Bhattacharyya: *Conformal Ricci solitons in Kenmotsu manifolds*, Glob. J. Adv. Res. Class. Mod. Geom., **4**(2015), 15-21.
[2] D.E. Blair: *The theory of quasi-Sasakian structures*, J. Differential Geom., **1**(1967), 331-345.
[3] U.C. De and A. Sarkar: *On three-dimensional quasi-Sasakian manifolds*, SUT J. Math., **45**(2009), 59-71.
[4] D. Dey and P. Majhi: *Almost Kenmotsu metric as a conformal Ricci soliton*, Conform. Geom. Dyn., **23**(2019), 105-116.
[5] M. Falcitelli, A. Sarkar and S. Halder: *Conformal vector fields and conformal Ricci solitons on α-Kenmotsu manifolds*, Mediterr. J. Math., **20**(2023), No. 3, Art. No. 127, 18 pages.
[6] A. Ghosh: *Holomorphically planar conformal vector fields on contact metric manifolds*, Acta Math. Hungar., **129**(2010), 357-367.
[7] Z. Olszak: *On three-dimensional conformally flat quasi-Sasakian manifolds*, Period. Math. Hungar., **33**(1996), 105-113.
[8] R. Sharma: *Holomorphically planar conformal vector fields on almost Hermitian manifolds*, Contemp. Mathematicians, **337**(2003), 145-154.
[9] R. Sharma: *Certain results on K-contact and (κ, μ)-contact manifolds*, J. Geom., **89**(2008), 138-147.
[10] A. Sarkar, A. Sil and A.K. Paul: *Ricci almost solitons on three-dimensional quasi-Sasakian manifolds*, Proc. Nat. Acad. Sci. India Sect. A, **89**(2019), 705-710.
[11] A. Sarkar, S. Halder and U.C. De: *Riemann and Ricci Bourguignon solitons on three-dimensional quasi-Sasakian manifolds*, Filomat, **36**(2022), 6573-6584.
[12] A. Sarkar, U.C. De and S. Halder: *On torse forming vector fields and their applications in submanifold theory*, Filomat, **37**(2023), 4261-4269.
[13] Y. Wang: *Gradient Ricci almost solitons on two classes of almost Kenmotsu manifolds*, J. Korean Math. Soc., **53**(2016), 1101-1114.
[14] K. Yano: *Integral Formulas on Riemannian Geometry*, Marcel Dekker, New York, 1970.

Received: August 23, 2023. *Revised*: December 12, 2023.
2020 *Mathematics Subject Classification*: 53C25, 53D15.
Key words and phrases: Quasi-Sasakian manifolds, conformal vector fields, conformal Ricci solitons.

University of Kalyani
Department of Mathematics
Kalyani 741235
West Bengal, India
E-mail address: sprnhldr92@gmail.com

Krishnath College
Department of Mathematics
Berhampore 742101
Murshidabad
West Bengal, India
E-mail address: kncsubrata71@gmail.com

University of Kalyani
Department of Mathematics
Kalyani 741235
West Bengal, India
E-mail address: avjaj@yahoo.co.in