

Title of the thesis:

CHARACTERIZATION OF SOME SOLITONS WITHIN THE  
FRAMEWORK OF VARIOUS DIFFERENTIABLE MANIFOLDS

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**Abstract:** This thesis consists of five chapters. The first chapter provides an introduction to different types of smooth manifolds and solitons.

In chapter two, we start with the study of conformal Ricci soliton on generalized Sasakian space form and then we characterize almost coKähler manifolds admitting conformal Ricci soliton. We also investigate conformal Ricci soliton on a  $(k, \mu)$ -almost coKähler manifold and prove the non-existence of conformal gradient Ricci soliton in this setup. Next, we give some characterization of conformal Ricci soliton on  $(LCS)_n$ -manifolds satisfying certain curvature conditions. Moving further, we prove that if a warped product of two Riemannian manifolds admits a conformal Ricci soliton, then the base and the fiber both admit conformal Ricci soliton. Also, the converse of this result is discussed when the potential function is of gradient type. After that, we show that, a warped product manifold admitting conformal Ricci soliton is an Einstein one provided the potential vector field is Killing or concurrent. Finally, some applications of conformal Ricci soliton on generalized Robertson Walker spacetime are discussed.


In chapter three, conformal  $\eta$ -Ricci solitons are characterized on  $\epsilon$ -Kenmotsu manifolds with Codazzi type, cyclic parallel and cyclic  $\eta$ -recurrent Ricci tensor and satisfying curvature conditions. Then, we study  $\epsilon$ -Kenmotsu manifolds admitting conformal  $\eta$ -Ricci solitons with torse-forming and gradient type potential vector fields. Next, we investigate the nature of conformal  $\eta$ -Ricci soliton and gradient conformal  $\eta$ -Ricci soliton on projectively flat and conharmonically flat almost pseudo symmetric Kählerian spacetime manifolds.

In chapter four, first we study some curvature properties of 3-dimensional quasi-Sasakian manifolds with respect to Zamkovoy connection and then, the nature of Ricci soliton on 3-dimensional quasi-Sasakian manifold with respect to Zamkovoy connection is characterized. Then, we study the nature of  $\eta$ -Ricci-Yamabe soliton on almost pseudo symmetric Kählerian spacetime manifolds. Next, it is shown that, on a generalized Sasakian spaceform, a quasi-Yamabe soliton, with potential vector field pointwise collinear to the Reeb vector field, reduces to a Yamabe soliton.

In chapter five, we characterize  $\eta$ -Einstein soliton on a 3-dimensional trans-Sasakian manifold. Then,  $\eta$ -Einstein solitons are studied on 3-dimensional trans-Sasakian manifolds with Codazzi type and cyclic parallel Ricci tensor and satisfying some curvature conditions. Finally,  $\eta$ -Einstein solitons with torse forming vector field are characterized on 3-dimensional trans-Sasakian manifolds.

  
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