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Title: **Geometry of Submanifolds and Applications**

Abstract

Submanifold theory plays an important role in the development of modern differential geometry. It is a very active and vast research field. Submanifold theory is still far from being exhausted; only a small portion of an exceedingly fruitful field has been cultivated and much more remains to be discovered. The present thesis has been written on the same basis and efforts were made to contribute something to the subject which are well motivated.

The thesis **"Geometry of Submanifolds and Applications",** is divided into six chapters, details of which are as follows:

Chapter 1. This chapter is introductory; here we describe basic definitions, formulae and results which are relevant to the subsequent chapters. Although most of these results are available in standard references on the subject, nevertheless we have collected them to make the thesis self contained.

Chapter 2. This chapter deals with the study of generalized normalized δ-Casorati curvatures. First we obtained two optimal inequalities for bi-slant submanifolds in generalized complex space forms involving generalized normalized δ-Casorati curvatures and discussed the equality case of the inequalities. We also obtained the results for different particular cases of bi-slant submanifolds. Next, we obtained bounds for generalized normalized δ-Casorati curvatures for bi-slant submanifolds of T-space forms and discussed the equality case of the inequalities. Finally, we derived inequalities for doubly warped product bi-slant submanifolds in generalized complex space forms involving Casorati curvature. Results of this chapter have been published in **Kragujevac Journal of Mathematics**, 42(4) (2018), 591-605 and **Filomat**, 32(1) (2018), 329-340.

Chapter 3. In this chapter, we derived sharp inequalities between the normalized scalar curvature and the generalized normalized δ-Casorati curvatures for submanifolds in Bochner Kähler manifold. Moreover, we also characterized submanifolds on which the equalities hold. Further we obtained same results for semi-slant submanifolds, hemi-slant submanifolds, slants submanifolds, invariant

submanifolds and anti-invariant submanifolds in particular. Results in this chapter have been accepted for publication in **Filomat**, (2017).

Chapter 4. In this chapter, we studied totally real submanifolds in Kähler product manifold with constant scalar curvature using self-adjoint differential operator □. Under this setup, we obtained some geometric results. Moreover, we discussed δ−invariant properties of such submanifolds and got an obstruction results an application of the inequality derived.

Chapter 5. This chapter is devoted to the study of statistical submanifolds in quaternion Kähler-like space forms. In the first section, we proved two optimal inequalities involving δ-Casorati curvatures and deduced some applications. In the second section we derived some general inequalities. In section third we mainly obtained Ricci-Chen inequalities. Finally, in the last section we discussed statistical version of well known B. Y. Chen inequality for totally real statistical submanifolds in the same ambient space. Results of this chapter have been published in **Journal of Geometry**, 109(1):13 (2018).

Chapter 6. In this chapter, we studied the statistical submanifolds in holomorphic statistical manifolds with constant curvature. First, we obtained B. Y. Chen inequality for statistical submanifolds in holomorphic statistical manifolds with constant curvature and deduced some applications. Next, we derived generalized wintgen inequality under same set up and state some applications of the derived inequality. Results in this chapter have been published **In: Nielsen F., Barbaresco F. (eds) Geometric Science of Information**, **Springer**, 10589 (2017).

Chapter 7. In this chapter, we have collected the findings of thesis and wrote the conclusion for further work. At the end of the thesis, a comprehensive bibliography is arranged alphabetically which by no means is exhaustive on the subject. Which have either been directly used in the thesis or have relevance to the work. In fact, only those works have been listed which have been referred in the body of the thesis by a serial number in a square bracket.