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COMMUTING PAIRS OF GENERALIZED CONTACT METRIC STRUCTURES

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Abstract. In this paper, we prove a theorem that gives a simple criterion for generating commuting pairs of generalized almost complex structures on spaces that are the product of two generalized almost contact metric spaces. We examine the implications of this theorem with regard to the definitions of generalized Sasakian and generalized co-Kähler geometry.

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1. Introduction

The notion of a generalized complex structure, introduced by Hitchin in his paper [8] and developed by Gualtieri [5, 6] is a framework that unifies both complex and symplectic structures. These structures exist only on even dimensional manifolds. The odd dimensional analog of this structure, a generalized contact structure, was taken up by Vaisman [16,17], Poon, Wade [14], Sekiya [15], and Aldi and Grandini [1]. This framework unifies almost contact, contact, and cosymplectic structures. Generalized Kähler structures were introduced by Gualtieri [5–7] and have already found their way into the physics literature [4, 9, 12]. A natural question to ask is when the product of two generalized almost contact metric structures produce a generalized Kähler structure.

Kähler structures are commuting pairs of generalized complex structures whose product forms a generalized metric. In this article, we prove the following theorem that gives a simple criterion for generating commuting pairs of generalized almost complex structures on spaces that are the product of generalized almost contact metric spaces. This reduces the assessment of whether the spaces could be generalized Käher to integrability issues.

Theorem 1. *Let M_1 and M_2 be odd dimensional smooth manifolds. Assume that M_1 and M_2 each have two generalized almost contact metric structures. Denote*

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