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On Finsler geometry of tangent Lie groups

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Abstract. This paper is divided into two main parts. In the first part, we study left-invariant Randers metrics on Lie groups. We characterize the class of left-invariant Randers metrics with isotropic mean Berwald and isotropic Berwald curvatures on Lie groups. This yields an extension of Deng's well-known theorem for left-invariant Randers metrics with isotropic S-curvature. In the second part, we consider the left-invariant Randers metrics on tangent Lie groups. Let G be a Lie group equipped with a left-invariant Randers metric F. Suppose that F^v and F^c denote the vertical and complete lift of F on TG, respectively. First, we find the necessary and sufficient condition under which these metrics are weakly Berwaldian. Then, we prove that these lifting Randers metrics are isotropic Berwald metrics if and only if F reduces to a Berwald metric. Finally, we give the necessary and sufficient conditions under which these metrics are of Douglas-type metrics.

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