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**Igor Zelenko\*** ([zelenko@math.tamu.edu](mailto:zelenko@math.tamu.edu)), Department of Mathematics, Mailstop 3368, Texas A&M University, College Station, TX 77843-3368. *Comparison theorems for number of conjugate points along sub-Riemannian extremals*. Preliminary report.

The classical Rauch comparison theorem in Riemannian geometry provides the estimation of the number of conjugate points along Riemannian geodesics in terms of bounds for the sectional curvature. We give a generalization of this theorem to extremals of a wide class of optimal control problems including sub-Riemannian extremals. The problem can be reformulated as the problem to estimate the number of conjugate points along a curve in a Lagrangian Grassmannian in terms of the invariants of this curve with respect to the natural action of the Linear Symplectic Group. Our treatment of this problem is based on the construction of the canonical bundle of moving frames and the complete system of symplectic invariants for curves in Lagrangian Grassmannians previously done in the joint works with Chengbo Li. We will explain how appropriately arranged bounds for these symplectic invariants effect the bounds for the number of conjugate points. The application for extremals of natural sub-Riemannian metrics on principal connections of principal bundles with one-dimensional fibers over Riemannian manifolds (i.e. magnetic fields on Riemannian manifolds) will be given. (Received August 12, 2010)