ON CARTAN'S METHOD OF LIE GROUPS AND MOVING FRAMES AS APPLIED TO UNIQUENESS AND EXISTENCE QUESTIONS IN DIFFERENTIAL GEOMETRY

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0. INTRODUCTION.

These notes are an exposition of the philosophy due to Elie Cartan that, via the use of moving frames, the theory of Lie groups constitutes a powerful and elegant method for studying uniqueness and existence questions for submanifolds of a homogeneous space. This philosophy, as expounded in his beautiful book "Groupes finis et continus et la géométrie différentielle", Gauthier–Villars (Paris), is perhaps not as widely appreciated as it should be, especially as regards the higher order invariants of a submanifold. A possible reason for this is that, even though the basic Lie group statements underlying the theory are of a rather general nature, their application to geometry seems at present more adapted to special cases depending on subtle conditions of non-degeneracy, rather than constituting a vast general theory. It is the intricacy and beauty of these special cases which in the end justifies the general approach. Our purpose here is to present a somewhat updated and hopefully clear exposition of a portion of the Cartan philosopy, together with a few traditional and some new applications to geometry. In particular, we emphasize the case of holo-

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