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The Principal Fibre Bundle and Riemannian connection on Riemannian Manifold

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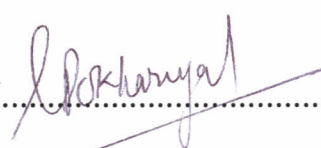
DECLARATION

This dissertation is my original work and has not been presented for any degree award in any University.

SIGN..........DATE.....19/06/2012.....

UWIMBABAZI RUGANZU LEON FIDELE

This dissertation has been presented with our approval as the university supervisors.

SIGN..........DATE.....20/06/2012.....

Prof. G.P POKHARIYAL

SIGN..........DATE.....21/06/2012.....

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Abstract

Differential geometry has long history as a field of mathematics and yet its rigorous foundation in the realm of contemporary mathematics is relatively new.

We have written this project, Principal fibre bundles and Riemannian connection on Riemannian manifolds with the intention of providing a systematic introduction to the applications of differential geometry.

We hope that this purpose has been achieved with the following arrangements.

In the first chapter we have given a brief presentation of differential manifolds, tangents and cotangent spaces. We have also included a concise account of tensor algebras and tensor fields, the central theme of which is the notion of derivation of algebras and tensor fields.

The second chapter is very important because it contains the notions of fibre bundles and connection theory. Results in this chapter are applied to linear and affine connections in the third chapter and to Riemannian connections in the fourth chapter.

To make this project it self- contained as much as possible, we have tried to give complete proofs of all standards results. Theorems, lemma, propositions and corollaries are numbered for each section.

For the last chapter, we have attempted to provide a physicist with the mathematical ideas underlying the sequence of discoveries just described. In addition, we have provided a mathematician with a feeling for some of the physical, problems to which mathematical methods might apply.