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A General Approach to Define Adjoint of Linear and Non-linear Operators

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Abstract : In this paper, we have obtained the adjoint of an arbitrary operator (linear and nonlinear) in Hilbert space by introducing an n-dimensional Riemannian manifold. This general formalism covers every linear operator (non – differential) in Hilbert space. In fact, our approach shows that instead of using the adjoint definition of an operator directly, it can be obtained directly by relying on a suitable generalized space according to the action of the operator in question. For the case of nonlinear operators, we have to change the definition of the linear operator adjoint. But here, we have obtained an adjoint of these operators with respect to the definition of the derivative of the operator. As a matter of fact, we have shown one of the straight applications of the ''Frechet derivative'' in the algebra of the operators.

Keywords : adjoint operator, non-linear operator, differentiable operator, manifold
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