

1. Title - 10 Words Max:

- A Study of Adaptive Finite Element Methods, and their Applications.
- A Study of Adaptive Finite Element Methods, and its Applications.
- A Study of Functional Spaces, and Adaptive Finite Element Methods.
- A Study of Function Spaces, and Adaptive Finite Element Methods.

2. Overview/Abstract - 300 Words Max:

By definition, Partial Differential Equations (PDE) are equations which impose relationships between the partial derivatives of a multi-variable function, where a partial derivative is essentially the rate of change of a quantity while holding the several other interdependent quantities constant. PDEs find their merit in that many physical, biological, and engineering related problems can be represented by means of PDEs. However, these equations often do not have analytic/exact solutions, so it becomes important to have Numerical Methods to approximate these solutions. Adaptive Finite Element Methods (AFEM) are fundamental Numerical Methods used to approximate PDEs, where we implement these methods by means of computers, specifically, by means of algorithms that use simple arithmetic operations that result in approximate solutions in a numerical form. With these definitions in mind, the goals of this project are to first conduct a study into Functional Spaces such as Hilbert and Sobolev Spaces, which are relevant to the analysis of PDEs and the construction of their solutions. Then, we will progress into the study of Numerical Methods induced by weak formulations of PDEs, namely, Finite Element Methods. And finally, we will study state of the art AFEMs by researching and applying relevant Numerical Methods from a survey in this topic.

3. Originality, Creativity, and Significance - 300 Words Max:

Some text

4. Potential Benefit - 250 Words Max:

Some text

5. Relevant Experience - 250 Words Max:

Some text