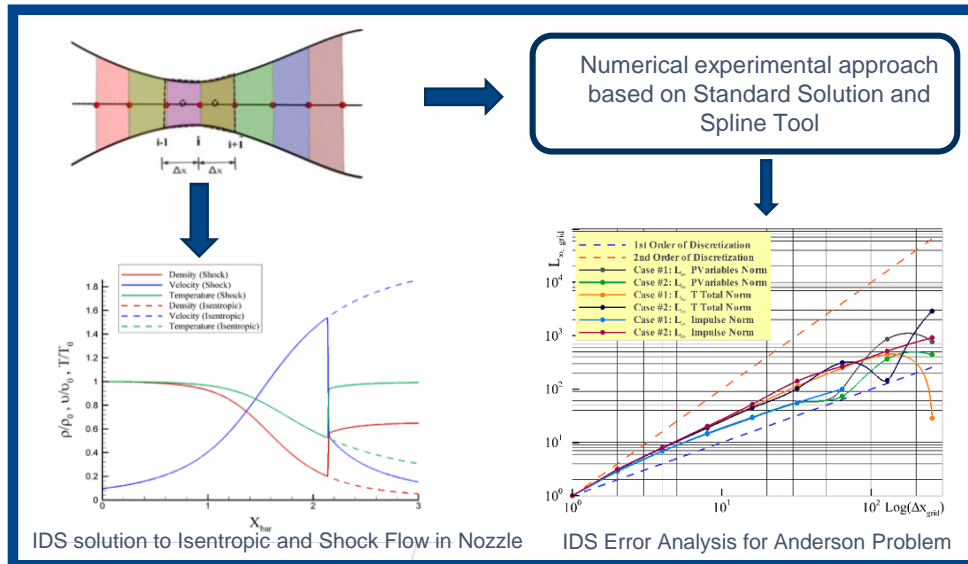


# David N. D. Dodoo-Amoo

*Department : Mechanical Engineering*

*Dissertation Title: An Error Analysis of the  
Integral Differential Scheme Navier-Stokes Solver*

*Major Professor: Dr. Frederick Ferguson*



## RESEARCH QUESTIONS / PROBLEMS:

The goal of this dissertation is to establish the accuracy of the Integral Differential Scheme (IDS) solver as a means of establishing the credibility of its solutions. This is done by

- Evaluation of the Spatial Error Behavior of the IDS
- Evaluation of the Temporal Error Behavior of the IDS

## METHODS:

- In lieu of analytical methods, a set of numerical experiments were created and implemented to analyze the error behavior.
- Numerical Exact Solutions (Standard Solutions) were obtained from grid independent solution coupled to a Spline tool
- Spatial and Temporal error analysis were performed using the standard solutions and various error norms.

## RESULTS / FINDINGS:

- The IDS delivers 1<sup>st</sup> order discretization accuracy for coarse grids
- As the grids are refined, the error approaches 2<sup>nd</sup> order accuracy
- The IDS is capable of producing exact solutions for unsteady problems.

## SIGNIFICANCE / IMPLICATIONS:

- The results from IDS implementation can now be considered credible.
- This methodology is applicable to error analysis of complex schemes.