Cherí West

Major: Chemical Engineering
University: Prairie View A&M
Faculty Mentor: Dr. David Retzloff
Mentor Department: Chemical Engineering
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The key to unlock the Navier-Stokes Equation

The key to unlock the Navier-Stokes Equation What causes the waves to break, as they get closer to the shore? Can the strain on the heart to pump blood throughout our bodies be decreased if vortices were eliminated? When galaxies are formed what causes the spiral effect? All these questions can be answered by understanding the Navier-Stokes Equation. This equation holds many secrets about fluid dynamics that mankind needs unlocked. The Navier- Stokes Equation was first written down in the 19th century by a French bridge builder, Claude-Louis Navier, and a mathematician, George Stokes. The equation was written down without a complete understanding of the concepts of shear stress and internal friction that exist in a fluid. Navier based is work on modifications to the Euler equations to take into account forces between the molecules in the fluid. These fluid equations have proved to be challenging to understand even today. For example, it is still not known if a solution to these equations exists for all time. Currently there is a $1 Million prize for the individual that can establish this fact. Finite differences were taken and then implemented in matrix form Ax = b, with A and b known, to solve for x. The LU-decomposition along with partial pivoting was the algorithm chosen to solve for x. We tested the program with a simplified example to check the validity of the code.□(j, k), rather than velocities, v. A grid was set up with periodic boundaries for two dimension flow to solve for □The numerical solution method that was chosen was the Crank-Nicholson (Implicit) Scheme. In two dimensions it turns out to be easier to work with the stream functions, with respect to x and y.γ values, the velocities can be found by taking the derivative of values. After finding all the necessary and the γ = -BC. Computer programming was an intricate part of solving for values that were calculated previously to determine C and then solving the equation B□ can now be found by using the □), γ values from the Ax = b program (where x = γUsing the calculated By creating an ideal situation for two dimension fluid flow, an understanding of how vortexes begin to form has turned the key a little more in our goal to unlock the secrets of the Navier-Stokes Equation.