® for this research. The ballute is part of a larger system which is used for atmospheric re

simulated. Meshes were created for each geometry. Meshing is done to closely replicate the triangulated geometry of a model. This triangulation was achieved, accounting for very small details in the model's geometry. The more details and

the triangulated space, which means that the same geometry was triangulated multiple times until the optimal

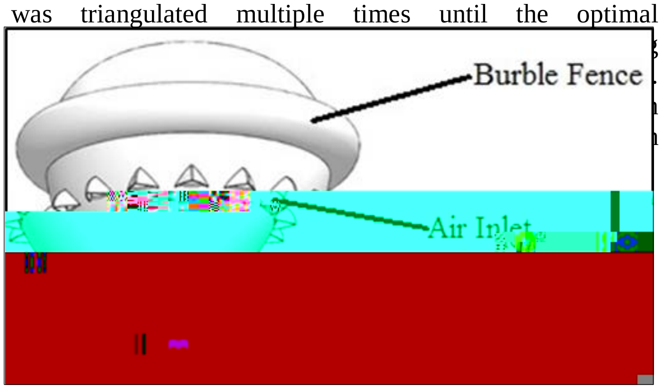

Figure 2 –

The goal of the aerodynamic scaling effect exploration was to compare the one hundredth scale results with the tenth scale results. The conclusion of this test was that aerodynamics cannot be accurately scaled. Refer to **Figure 3**.

Few Fluent flows did ever reach convergence, which is a very necessary condition to be met because when the residual values are not changing from one iteration of the same calculation to the next iteration, it shows that the air flow has reached a steady state. This means that, since the transient period has passed when air flow patterns are unpredictable, measurements can be taken with the valid assumption that the present conditions at steady state will continue until the air flow changes upstream velocity or angle of attack. Once the residuals converge, comparative data can be shown between two solutions that have converged calculations.

Due to the complexity of the transport equation calculations necessary to compute an internal air flow of this supersonic inflatable aerodynamic deceleration (SIAD) device, the computational model with air inlets, as seen in **Figure 1**, was not used for any Fluent® simulations. The time necessary to compute this complex model must only by used when the result is sure to be accurate and comparable to experimental results.

The larger scale ballute model was calculated numerous times in order to create a proper comparison to the scaled down ballute model that had a converged calculation. It was later concluded that, the model is not scalable, which therefore make it impossible to expect the results of a scaled down object's air flow to be nearly approximate to the scaled up object's air flow patterns. Compare **Figure 3** and **Figure 4** to see these un-scalable aerodynamic effects of air flow around the differently sized ballute bluff bodies.

Future Research

The research conducted has made substantial progress in the direction of creating an ANSYS® simulation model that would solve for the proper conditions of air flow around a ballute. This task has still not been completed, however it has been orientated in a new direction. The new methods that have been investigated for creating proper results of a highly turbulent air flow involve selecting the

set that will properly simulate what must be artificially created in order to replicate an experimental result for an aircraft of this size. Simpler models have also been used, including simulating the ballute with laminar air flow; this did not prove to be a valid approximation and was used

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