

The beginning of my research career started at the Applied Physics Institute (API) under the supervision of employer and professor, Phillip C. Womble. The API is a multidisciplinary research institute specializing in nuclear physics, nuclear engineering, material science, and much more. While there, I was given several tasks requiring the use of computational methods utilizing finite element analysis to model several complex situations varying from acoustics to electrostatics. Most notable was a benchmark of the new COMSOL Multiphysics acoustic module. This benchmark test was well received at my presentation of the results at the 2007 International COMSOL Conference in Boston and followed up in the proceedings for the conference. Following up on the results to the benchmark, I was assigned to investigating more complex models of mechanical sound transfer through various media. This deep study resulted in a modeling procedure to analyze acoustic barrier penetration and was presented at the 2007 Argonne Undergraduate Symposium.

The most useful products of these research projects and others were the skills I gained from them. Thanks to the many research projects I have been a part of, I am now proficient with COMSOL Multiphysics, AutoCAD, Rhinoceros, SolidWorks, as well as being moderately proficient with VB.NET, LabView, and MCNP. Most recently I have been researching ways to reduce current mammography methods by advancing visual contrasting using mechanical waves to increase tissue density rather than the extremely painful methods used today. This task, under Dr. Ivan Novikov, will require the use of much computer and physical modeling, as well as needing skills from several disciplines. Unfortunately, I will not see the end of this project as I am graduating this year, but in order to better serve the API and hopefully the Department of Physics and Astronomy, I have made an extensive primer for the use of COMSOL Multiphysics as well as instruction in the use of the complicated Acoustic Module within COMSOL.

While at WKU I have worked with Dr. Novikov on researching ways to revolutionize mammography methods and also implement neutron activation analysis for examining the human body, I have worked with Dr. Womble on utilizing and optimizing COMSOL to perform required tasks in a "defense related project", I have begun, under my own supervision, working on MCNP to devise a method of eliminating the time consuming task of defining geometries through coding by using SolidWorks to design and compile a text based ACIS SAT geometry input files. My experiences at WKU have been diverse, and I feel that thanks to those individuals who have employed me for research, I am graduating with not just the knowledge and education that the course work offers, but also a set of skills to apply to future tasks that I could have not obtained in any other way.