CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
S1221

Project Title
Improving Surface Reconstruction from an Inertial Fusion Target Spheremap

Abstract

Objectives/Goals
Objective of my work was to develop a program to process experimental data of sphericity achieved using Spheremapping at General Atomics as well as to develop and realize in code an algorithm to correct misestimations in the model created.

Methods/Materials
- Loading of the experimental data.
- Parsing of the data.
- Creating spherical and Cartesian coordinates of the data.
- Identifying intersections.
- Identifying average centers for traces.
- Adjusting average centers for traces.
- Identifying intersections again to find the new points of intersections.
- Identifying average radii.
- Adjusting average radii.
- Visualization of the results.

Results
I developed a program in C programming language to process experimental data of sphericity of a capsule for a DT target. For this cause I developed and realized in code a special algorithm that can determine and correct the estimation error in the radii and centers of the bands. The program also provides data as well as visualizes a 3D model of the surface of the target. This program was used to aid in development at General Atomics of a program for full surface characterization with 10nm height resolution. The developed program will help improve the production of the capsules of the DT targets for Inertial Fusion Technology.

Conclusions/Discussion
A numerical investigation was performed to analyze the possibility of correction of misestimations in spheremapping data. The developed program improved the errors due to misestimations from 852nm to 454nm. The results were used at General Atomics for full surface characterization of a target.
Possible improvements to the program include:
- Adjusting algorithm.
- Increasing the flexibility of the program.
- Better user-interface.

Summary Statement
A numerical invetigation was performed to analyze the possibility of correction of misestimations in spheremapping data that was used at General Atomics.

Help Received
Used equipment of Gnereal Atomics under supervision of Dr. Richard Stephens