Enhancing Thermo Photovoltaic Structures

By: Mario Reyes Jr.
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Mentor: Dr. Georgios Veronis

Graduate Student: Christopher Granier
Motivation

- Optimizing thermo photovoltaic panels
- Reducing the amount of energy that gets converted to waste heat
- Boosting structures to cover a wider range of wavelengths and narrow angle absorber
Methodology

- Used matrix transfer technique that worked for 1D thin structures
- Each slab had a $\Delta$ matrix, which corresponded to the transition between two materials
- Each layer of the structure also had a $\Pi$ matrix, which was the interaction that happened inside the material
- The matrices were multiplied with one another and gave information about the whole structure, such as reflection, absorption, and transmission.
Computer Programs

- Helped make a program that can optimize over several wavelengths and angles where the preceding version only covered angles
- This was done by combing both codes into one
Results

absorptivity vs. angle theta in degrees

absorptivity vs. wavelength
Results

Absorptivity vs. angle theta in degrees

Absorptivity vs. wavelength
Summary

• Created a program that can optimize over several wavelengths and angles where the previous version only optimized over angles.

• Instituted runs on the Genetic Algorithm and the Forward Code which yielded results that were analyzed.
Questions ?