

## Intellectual Merit Criterion

### Overall Assessment of Intellectual Merit

Excellent

### Explanation to Applicant

I am incredibly impressed by this applicant. This is a student who came from a poor rural background in Hawaii, given little academic encouragement, a student who receive poor grades early on, but who turned things around and has made amazing strides in a positive direction. Her trajectory is not just increasing, it is convex. After being exposed to real science in a lab, she became increasingly academically focuses. Her grade improved dramatically, and she applied to graduate school. SMU saw her potential and took a risk, and it appears to be paying off very well. She began working on difficult topics in partial differential equations, taught herself how to program in C and C++, and began writing large codes to simulate PDEs. She is currently working on a paper which is likely to be submitted soon. The research plan itself is not the most amazing project I have seen, and yet it a solid piece of work which develops innovative new methods. The Galerkin boundary element method for time-evolving boundaries she is advancing for problems with moving boundaries is challenging, innovative, and has the potential to improve simulations in a wide variety of physical contexts. Her work involved the challenging work of finding singularity-removing transformations for the underlying intervals as they evolve in time. It is an impressive piece of work for any graduate student, but taking into consideration this student's background, it is absolutely outstanding.

## Broader Impacts Criterion

### Overall Assessment of Broader Impacts

Excellent

### Explanation to Applicant

The broader impact of the research are significant, and will clearly be of interest to those working in the field, as well as researchers in other fields, including engineering, physics, and industrial applications. The student is interested in community outreach, and has served as a mentor through the Ka Pilina project for teenagers who are Native Hawaiian, female, or disabled. She also founded and ran a math club, which held departmental colloquia on various STEM topics. She continues to work with underrepresented groups though the local SIAM student chapter, where she teaches programming to student with no programming experience. She plans to become a math professor, and with the impressive trajectory she is on, it may be very likely to happen.

## Summary Comments

This is a very unusual application, but one that I support strongly. It contains an academic rags-to-riches story, and is an excellent example of a student turning her life around and not looking back. The story alone would not be enough for my support, but the proposed research itself is quite good. This student appears to be a diamond in the rough. One could see it as a risk to go with such a student, but to me, this application appears to me a risk worth taking. Given the opportunity, this student will go very far.

## Intellectual Merit Criterion

### Overall Assessment of Intellectual Merit

Very Good

### Explanation to Applicant

The student's research experience includes techniques of drosophila, and as an undergraduate research intern at UHERO

genetics, database management using HEREMOS and data aggregation as individual work for the purpose of researching state economic development and growth in the real estate sector. She studied and presented on the derivation of Hilbert transforms and their application in wave analysis, Fourier spectral analyses, and singular value decomposition for empirical orthogonal functions.

## **Broader Impacts Criterion**

### **Overall Assessment of Broader Impacts**

Very Good

### **Explanation to Applicant**

Her research experience applies to signal processing on ocean wave analysis, which she presented at 2016 Ocean Sciences meeting.

### **Summary Comments**

The applicant seems to have had to work extra hard for getting where she wanted to be. All her effort are highly commended. She would continue her work with underrepresented groups through community outreach by getting involved with the local SMU-UTD SIAM student chapter.

## **Intellectual Merit Criterion**

### **Overall Assessment of Intellectual Merit**

Very Good

### **Explanation to Applicant**

There are numerical methods other than boundary element methods for melting and cooling problems. The benefit to using boundary element method is that only the boundary needs to be discretized, and not the interior. This makes computationally easier.

## **Broader Impacts Criterion**

### **Overall Assessment of Broader Impacts**

Very Good

### **Explanation to Applicant**

She is definitely a role model for those disadvantaged Pacific islanders, especially for female islanders. Other than overcome those hardships, she still found time to help those who were struggling, tutoring, mentoring, ... you name it. Her proposed project has been employed in thermal simulation with very particular industrial applications.

### **Summary Comments**

The applicant was a student from an underperforming public school on a rather underdeveloped island in Pacific Island. She learned from mistakes when she was undergraduate. However a series of mistakes did not discourage her study. She worked hard and paid her passion to her community helping those people who were struggling. Her experiences are similar to a TV show. When she got help, she totally developed her talent at graduate school. Her project using boundary method solutions to the heat equation on interfaces with moving geometries, may be a better way than our current other methods.