Around the world, the energy over consumption issue has been one of the key socio-economic and political challenges, which has drastically worsened over the last few years. Over the years engineers and environmentalists have proposed several approaches to improve energy efficiency. One is to reduce energy demand by improving consumption habits and a second approach is to introduce the use of a "greener" concept by using biomaterials in a diverse and more efficient manner in engineering construction to create energy efficient environments.

This work will investigate the effects of using "green" stabilized earth materials to provide and enhance thermal regulation for indoor environments. This effects can be compared to what skin does to regulate body temperature in humans, animals, and plants. On this effort the thermal behavior of several biomaterials will be analyzed using a computational tool in order to test the mechanical properties of biomaterials and also several geometry configurations to minimize the energy needed for heating and cooling an environment.

In this research a localized radial basis function (LRBF) meshless method, developed by the Computational Mechanics Lab (CML) at the University of Central Florida, has been implemented to test several wall geometrical configuration using known biomaterials such as clay. The advantage of using the LRBF meshless method in this particular research is based in the accuracy of the numerical method and also because it decreases computation time regardless of model complexity geometry without the need of mesh generation. This research includes a complete description of the LRBF meshless method, as well as a quantification of cooling methods that have been used by past civilizations and recent construction standards but have not been validated on scientific basis. Results are presented which will demonstrate the effectiveness of using integrated sheets of biomaterials in engineering construction to increase energy efficiency in indoor environments.

Major: Mechanical Engineering/Thermofluids

Educational Career:
Bachelor's of Mechanical Engineering, BS, 2008, University of Central Florida

Committee in Charge:
Eduardo Divo, Chair, Engineering Technology
Alain Kassab, MMAE
Reddi Lakshmi , CECE

Approved for distribution by Eduardo Divo, Committee Chair, on July 9, 2010.

The public is welcome to attend.