I am looking for 1-2 additional students to join a team of students working on the modeling, design, and testing of a cookstove that uses biomass fuel to produce both biochar and heat for cooking. In recent years, there has been much interest in designing improved cookstoves for use in developing countries. Improvements have focused on reducing harmful emissions and improving efficiency. We are working on a different type of cookstove, which produces both heat and biochar. Biochar is a carbon-rich residue of combustion, similar to charcoal, that has been shown to have beneficial effects on soil fertility. Biochar in the soil also sequesters carbon, at least temporarily, thus potentially serving as a net sink for CO\textsubscript{2} from the atmosphere.

The project is part of a large project based in Soil and Crop Sciences and involving collaborators at other universities and abroad. Our part of involves using commercial software (www.fluent.com) to model the heat transfer, fluid flow, and chemical reactions inside the stove. We will then use this model to improve the geometry of the cookstove. Optimizing the geometry is only part of the picture – we must also consider factors that make the stove convenient to use and safe. For instance, we ask questions like: How easy is it to load the fuel into the stove? Can the heat output be varied for different cooking tasks? Can we guard against dangerous pyrolysis products, like CO\textsubscript{2}?

Students with an interest in numerical modeling can contribute, as can people who are interesting in fabricating, instrumenting, and testing a prototype cookstove. There are extensive interactions with faculty, students and staff in MAE and in Soil Sciences. This semester, as the first generation is deployed in Kenya, we plan to:

- Perform efficiency and pollution tests of current cookstove designs
- Build a new dilution tunnel for improved pollution measurements
- Perform FLUENT calculations for the next round of design improvements

GENERAL INFORMATION ON BIOCHAR: [http://www.biochar-international.org/biochar](http://www.biochar-international.org/biochar)

DESERED QUALIFICATIONS (not needed for all projects) – familiarity with heat transfer, fluid mechanics, thermodynamics, and basic chemistry. Also desirable, but not necessary: experience with FLUENT, CFX, or COMSOL software, hands-on lab work, coursework in combustion or numerical modeling.

Work on the cookstove project can be used for M. Eng. or senior design credit, or can be taken as independent study (MAE 4900).

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