

Architecture 4.411

Building Technology Lab

Assignment 4 Solar Heating and Building Thermal Dynamics

February 25 and 26, 2004

The fourth and last phase of our first lab consists of the following:

1. Download data from your second test period, which should be a week long and a minimum of six days. A mix of sunny and cloudy days is highly desirable and should influence the duration of your test period.
2. Compare your measured data with an after-the-fact prediction made with measured outdoor temperature and solar radiation. The teaching assistant will provide you a spreadsheet that incorporates these data and allows you to input your Hobo data as well. Please schedule with the teaching assistant to retrieve your elf house either Friday or Monday. Your data analysis can rely on your inspiration but please consider the following: the mean difference between indoor and outdoor temperatures, for sunny, cloudy and all days, for both prediction and measurement; the range from high to low temperatures, for both prediction and measurement; and an estimate of the actual time constant of your elf house, obtained by adjusting your prediction after the fact as necessary to match your measurements as best you can.
3. Adapt the provided Matlab .m file to accurately simulate your elf house. Include, if possible, your estimated outside temperatures and solar gains. There is no need to account for sol-air effects. Further adapt the file to investigate one case where wall mass and insulation are in two configurations: mass outside (most of) the insulation and wall mass inside (most of) the insulation. Please print your input file and graphs for your report.
4. Prepare a 10-minute presentation for lab next week to describe your work, which should include all data and as much analysis as you have been able to perform. No need to cover Mr. Potato Head. No late presentations, please!
5. Prepare a written lab report using the provided checklist and submit the report in lab in two weeks, March 10 and 11, 2004.