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Investigation of Rooftop Radiative Cooling for Green Building Design LIN SU, DENNIS KUHL, Marietta College — The efficiency of a rooftop radiative cooling system was investigated for the environmental conditions at Marietta, Ohio. A 24"x24"x21.5" house model was built as test cell. Each wall had 1.5" of foam insulation in between two 0.5" thick plywood boards. The roof component consisted of a layer of 7/8" thick concrete on the bottom, a layer of 1.5" thick insulation in the middle, and a thin steel plate on the top. Copper tube was embedded in the concrete layer and run on top of the steel plate. Water was circulated in a closed cycle from a reservoir through the concrete and through the radiator. Temperature was monitored inside the house, in the flowing water, outside the house, and inside the concrete layer. Relative humidity was monitored inside the model and outside the model. Results will be presented that indicate that slower water flow rate corresponds to higher radiative cooling efficiency, which is consistent with previously published results. Preliminary results of investigations of the effects of relative humidity will also be presented.

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