

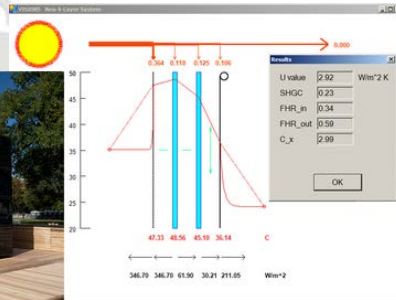
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Image courtesy of Jim Tetro, U.S. Department of Energy Solar Decathlon



CASTING LIGHT ON WINDOW SHADES

John L. Wright, Michael R. Collins

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For hundreds of years, people have used venetian blinds to keep buildings cooler in summer and warmer in winter. Simply adjust

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Existing computer programs can accurately model heat gain and loss through unshaded windows. Where they fall short is when you add attachments like blinds or drapes to the window. That's a problem for green building design since the "greenhouse" effect, created when sunlight passes through glass, represents a significant energy load and can dramatically increase indoor temperatures.

WISE researchers John Wright and Michael Collins set out to solve that problem. The two mechanical engineers have proposed a new approach to modeling heat exchange that tackles the coupled problem of convective and radiant heat transfer between layers.

The models they have developed can handle any combination of heat-blocking and light-blocking layers within a window, as well as any combination of indoor, outdoor, air and mean-radiant temperatures. These models have now been incorporated in various building simulation packages including ESP-r, the ASHRAE Toolkit and the California Simulation Engine.

UW students put the new ESP-r capabilities to work in the design of North House, a solar-powered house designed by researchers at Waterloo, Ryerson and Simon Fraser University for the U.S. Department of Energy's 2009 Solar Decathlon. Because the North House relies heavily on windows to maximize passive solar heating - and on shading to keep indoor temperatures comfortable - it was the perfect test for the shading simulation module.

Today, these accurate modeling tools are helping builders, architects and energy experts design green buildings: buildings that take full advantage of tried and true techniques, like venetian blinds, to cut energy costs.

Partners: Natural Sciences and Engineering Research Council, ASHRAE