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Authors

Kammerud, R
Place, W

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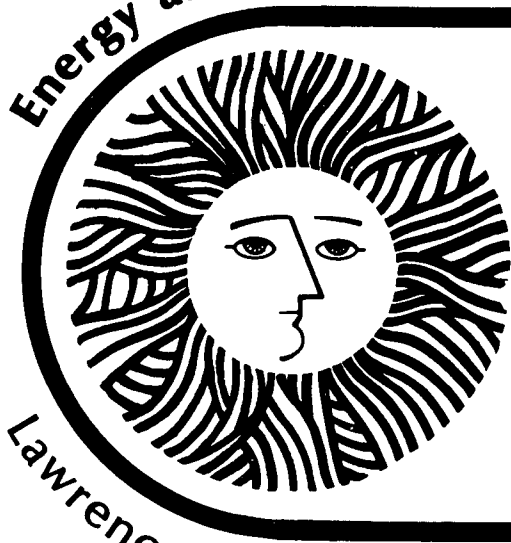
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Abstract

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Energy and Environment Division



Passive Analysis Capabilities of BLAST

R. Kammerud and W. Place

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Lawrence Berkeley Laboratory University of California/Berkeley

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PASSIVE ANALYSIS CAPABILITIES OF BLAST*†

R. Kammerud and W. Place
Passive Solar Group
Lawrence Berkeley Laboratory
Berkeley, California 94720

BLAST is a state-of-the-art, user-oriented, public domain building energy analysis computer program which accounts for the energy consumption impacts of both architectural and engineering design features. The program incorporates a detailed, hour-by-hour thermal balance load calculation as well as an hourly simulation of the air handling system and central plant equipment operation. Because of these capabilities, the program is applicable to both residential and commercial buildings.

BLAST, which already possesses extensive capabilities for analyzing the thermal performance of conventional buildings, is currently being modified to provide passive solar analysis capabilities. Models which describe the unique heat transfer processes occurring in passive structures are being developed and incorporated in the program. The objectives of this work are (1) to provide a documented passive solar analysis program which is available to the building design industry and (2) to produce an analysis tool which can be used specifically to evaluate the applicability of passive solar design concepts to commercial-scale buildings.

Results will be presented on the validation of BLAST for south aperture, direct gain systems. This validation compares BLAST simulations to test cell measurements and has been extended to investigate the sensitivities of the simulation to a variety of assumptions that typically are part of passive solar analysis. Included in this sensitivity investigation are the effects of temperature dependent convection coefficients, solar irradiance distribution on internal surfaces, and solar absorption properties of internal and external surfaces. Additional capabilities for analyzing south aperture, indirect gain systems (single and multi-story), ventilation cooling, and movable glazing insulation systems will be described.

*BLAST is copyrighted by the Construction Engineering Research Laboratory, Department of the Army, Champaign, Illinois.

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