Title : Evaluation of Heat Transfer Characteristics of Building Wall Elements
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Abstract. The paper is concerned with the evaluation and comparison of the thermal performance of different wall elements as typically used in the construction of buildings in the Kingdom of Saudi Arabia. The investigation is carried out under steady periodic conditions and for the climatic data of the city of Riyadh. A numerical model based on the finite-volume and implicit procedure is developed for the computation of the time-dependent and nonlinear temperature variations through composite layers. The model is validated against an exact analytical solution for a simplified problem. The detailed and overall heat transfer characteristics of four commercial wall structures are determined during representative days for the months of July and January. The effect of wall orientation; namely, north, south, east and west on the thermal performance is also studied. The R-values under dynamic conditions are established which include, implicitly, the effect of wall energy storage, solar insolation, wall orientation, season and radiation exchange along with the nominal thermal resistance parameters.