

Abstract

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analytical experimental investigations of climatic periodic heat transfer
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this paper introduces an investigation of periodic heat transfer characteristics through the solid layers analytically numerically. the solid layer was assumed to be exposed to an external medium having a periodic temperature variation on one side. while, the other side is subjected to a medium having a constant temperature. three different initial temperature distributions through the layer thickness were studied. the initial temperature distributions through the layer thickness were assumed to be constant at zero, constant at non-zero linear distributions. the analytical solution was carried out by using laplace transform the inversion theorem. the numerical solution was done using the finite difference method the conduction transfer function method. the analytical numerical solutions found the instantaneous temperature heat fluxes at both inner outer surfaces of the solid layer. a cork slab was used to be the solid layer as a case study. the spatial temporal temperature through the cork slab was found. the results show that the linear initial temperature distribution is more realistic rather than the zero non-zero initial temperature distributions. after enough time, the initial temperature distribution through the layer has almost no effect on the results. the comparison between the results from both analytical numerical solutions shows quantitative qualitative agreements.