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SOIL TEMPERATURE PROFILE INVESTIGATION UNDER ARID CLIMATE OF KUWAIT USING MECHANISTIC AND MIXED MODELS

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Abstract

Soil temperature prediction at several depths is crucial for environmental, engineering, and management applications. In this study, two approaches, namely the mechanistic model and the mixed model, are used to estimate the soil temperature at depths from 0.05 m to 8 m and compared with measured data. The Carslaw-Jaeger equation's parameters, the average, the amplitude, and the phase lag, that suit an arid environment such as Kuwait are determined by the two techniques. Heat flux analyses of the soil are presented. The generated models are tested against the measured data with different statistical tests such as R^2 , RMSE, and MAPE. Values of R^2 for the mechanistic and the mixed models range from 0.9119 to 0.9315 and 0.9068 to 0.9268 respectively, for the depths from 0.05 m to 1 m.

Key words: climate change, energy budget, environmental simulation, root zone temperature

Received: May, 2020; Revised final: December, 2020; Accepted: December, 2020; Published in final edited form: July, 2021

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