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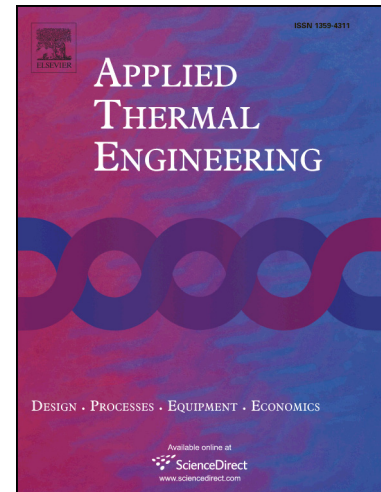
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Evaluation on the Influences of Lakes on the Thermal Regimes of nearby Tower Foundations along the Qinghai-Tibet Power Transmission Line

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Abstract: Lakes/ponds in permafrost regions may have strong thermal influences on the foundation of adjacent infrastructures such as railways, highways, and transmission lines. To assess the thermal influences of lakes on the stability of tower foundations along the Qinghai-Tibet Power Transmission Line (QTPTL), field works were conducted during mid- to late- April 2015 to investigate the distribution of lakes along the QTPTL. The results showed that the majority of the lakes are either too far from tower foundation (~ 200 m) or too small (less than 50 m in diameter) or too shallow (shallower than 0.7 m) to make considerable thermal influence on the tower foundation soils. The lake K-1047 in Kaixinling region may be the most possible one to make influence on the thermal stability of nearby tower foundation. A series of numerical simulations were conducted to evaluate the influence of the lake on a nearby shallow foundation. The results show that the lake influences the thermal regimes of permafrost soils 30 m away from the lake, speeding the degradation process of the permafrost foundation soils. This thermal influence will shorten the operational duration of the tower foundation, especially in condition of climate warming. This study may provide some insights into the future design and construction of the similar engineered infrastructures in permafrost regions.

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