

电工电机

行波激励下输电塔-导线体系纵向地震反应分析

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摘要: 基于所建立的输电塔-导线体系空间有限元模型, 利用非线性时程分析法研究了体系在行波输入下纵向地震反应特性, 并和一致地震动输入下的反应情况进行比较。结果表明: 行波输入可增加也可降低输电塔的地震反应, 这与行波波速、地震动性质都有关系; 行波输入很大程度上增加了导线的轴力反应, 随着行波波速的提高导线轴力逐步降低并接近于一致输入时的情况; 行波输入强烈地放大了导线的纵向和竖向位移反应, 特别是后者在近断层地震波输入时; 输电塔-导线体系的地震反应受行波波速影响很大。

关键词: 输电塔-导线体系 地震反应 行波输入 一致输入 近断层地震动 行波波速

Longitudinal Response of the Power Transmission Tower-cable System Under Traveling Seismic Wave Excitations

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Abstract: Based on the established model of the power transmission tower-cable system, the seismic response of which is analyzed with time history method. Furthermore, the seismic response under traveling seismic wave excitations is compared with that under uniform excitations, the result indicates that: the traveling seismic wave excitation can increase, or decrease the seismic response of the transmission tower-cable system, which depends on both the traveling-wave velocity and the ground motion characteristic; the traveling seismic wave excitations increase the cable's axis force in a large scale, which will decrease gradually and is close to the case of uniform excitations along with the traveling wave velocity increasing; the traveling wave strongly magnify the cable's displacement response on the longitudinal and vertical, especially the latter is under the excitations of the near-fault ground motions; the traveling wave velocity has a great effect on the seismic response of the power transmission tower-cable system.

Keywords: power transmission tower-cable system seismic response traveling seismic wave excitation uniform excitation near-fault ground motions traveling-wave velocity

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