



### 基于瞬时输入能量时变特征的SDOF体系位移历程模拟

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### THE SIMULATED DEFORMATION RESPONSE OF SDOF SYSTEM BASED ON TIME VARYING CHARACTERISTIC OF MOMENTARY INPUT ENERGY

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**摘要** 目前地震能量分析方法的研究多集中于对结构总输入能与总滞回耗能的简化估计, 忽略了能量沿时间轴输入历程的不同所导致的结构反应的差别。该文以瞬时输入能量在时间轴上的分布特征(瞬时输入能量时变特征)来描述地震能量输入历程的特点, 并通过建立瞬时输入能量时变特征与结构位移历程之间的联系, 获得了基于能量参数的结构位移历程求解方法。为验证该方法的准确性, 采用最大位移值和等效循环次数两个指标分别进行比较, 分析表明, 该方法在模拟弹性结构的幅值反应和持时反应上具有较好的准确性。该模型的获得将为基于能量概念的弹塑性结构损伤历程研究提供必要的基础。

**关键词:** 总输入能 瞬时输入能 地震持时 线弹性体系 位移历程

**Abstract:** Currently, analytical methods based on seismic energy of structures mainly focused on the simplified estimation approach of input energy and hysteretic energy. As a result, the response of structures can't reflect the effect of time-frequency characteristics of earthquake energy. A mathematical model is proposed in this paper to reflect the time varying characteristic of momentary input energy. By establishing the relationship between the time varying characteristic of momentary input energy and the deformation history of a linear single degree of freedom (SDOF) system, the paper developed a simplified procedure to simulate the deformation history, which was validated using the maximum deformation and cyclic demand spectrum of a linear system. It is found that the simulated deformation response can reflect the max amplitude of actual deformation and the effect of duration. This research provided theoretical foundation for the study on the simulated deformation history and the quantization of cumulative damage.

**Key words:** input energy momentary input energy ground motion duration linear system displacement time histories

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- [1] 陈 逵;刘哲锋;沈蒲生. 结构瞬时输入能量反应持时谱的研究[J]. , 2011, 28(1): 19-025.
- [2] 谢肖礼;王 波;张伟峰;郑海涛. 罕遇地震作用下高墩连续刚构桥双重非线性抗震分析 [J]. , 2009, 26(4): 113-118,.