

# The application of ABAQUS in seismic analysis of connected structures

Jiachun Cui, Chengming Li, Wei Tian, Dongya An

Technical Center of Shanghai Xian Dai Architectural Design (Group) Co.,Ltd.

20F, 258 Shimen Er Road, Shanghai, China. 200041

[Jiachun\\_cui@xd-ad.com.cn](mailto:Jiachun_cui@xd-ad.com.cn), [chengming\\_li@xd-ad.com.cn](mailto:chengming_li@xd-ad.com.cn),

[Wei\\_tian@xd-ad.com.cn](mailto:Wei_tian@xd-ad.com.cn), [dongya\\_an@xd-ad.com.cn](mailto:dongya_an@xd-ad.com.cn)

*Abstract: The connected structure refers to the kind of building which is composed of two or more towers connected by the connecting body in a certain height, belonging to the irregular building structure system. According to "Technical Specification for Concrete Structures of Tall Building" (JGJ3-2002), the time-history analysis method should be adopted in the seismic analysis of the connected structure. The structure may have a larger plastic deformation under rare earthquake, so it is difficult to converge when the implicit solution method is used by the conventional finite element software. While the explicit integral technology provided by ABAQUS can solve the nonlinear dynamics problems better, it has a broader application in elastic-plastic dynamic analysis. Taking a specific project as an object, the application of ABAQUS in seismic analysis of connected structures is presented in detail in this paper.*

*Key words: ABAQUS, connected structures, elastic-plastic, seismic analysis.*

## 1. Introduction

### 1.1 Connected structures

The connected structure refers to the kind of building which is composed of two or more towers connected by the connecting body, for example, a joint gallery, in a certain height, belonging to the irregular building structure system. Due to the existence of multiple towers and the connecting body, the response of the connected structure is far more complex than the monomer structure and the multi-tower structure without connecting bodies. It is shown that in the Kobe Earthquake in Japan and the Chi-Chi Earthquake of Taiwan, the connecting bodies themselves collapsed more and meanwhile, the parts linked to the main structure and connecting bodies were seriously damaged"(Ren Xu, 2006)". Therefore, in practical engineering applications, further study should be made on the stress characteristics of connected structures, especially on the dynamic response of connected structures under rare earthquake.

According to the literature [5], the following requirements should be met for the seismic analysis of high-rise buildings with complex structures: