THE DEVELOPMENT OF ATTENUATION RELATIONS IN THE ROCK SITES FOR PERIODS (T=0.04～10s, ξ =0.005, 0.02, 0.07, 0.1 & 0.2) BASED ON NGA DATABASE

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ABSTRACT :
The design spectrum with different damping ratio is in general calculated from the spectral values of damping ratio 0.05 using the empirical modification relations. With the large-scale and important structures, such as nuclear plant, being built in large number, the current aseismic Codes cannot address the requirements in the multi-damping and the long-period aspects. The large amount of recordings in the US NGA project makes it possible for us to study the multi-damping characteristics of acceleration response spectrum in the period range up to 10s. By the statistical analysis to the 260 recordings selected from the NGA database, the spectral acceleration attenuation relationships in the period range 0.04-10s are proposed for the damping ratios 0.005, 0.02, 0.07, 0.1, 0.2.

KEYWORDS: attenuation relationship, different damping ratio, NGA (Next Generation Attenuation) database

1. INTRODUCTION

Hu Yuxian(1999) indicated, due to the safety of nuclear plants and lack of experience in China, so Chinese nuclear security bureau used all files of international atomic energy agency. But occasionally a little corrected work can be done when different experience come into being.

Chinese code for seismic design of nuclear plants has two characteristics: firstly, it includes five kinds of spectra (ζ=0.005, 0.02, 0.05, 0.1, 0.2), secondly, it is an envelop spectra so that it envelop all standard spectra β (T, ς) and has wide frequency, from 1/0.03s to 1/10s. It is often used on rock and stiff soil sites because nuclear plants are often built on the two kinds of site.

Zhou Yongnian et al. study modification relation between spectra with different damping ratio. In Code the design spectrum with different damping ratio is in general calculated from the spectral values of damping ratio 0.05 using the empirical modification relations. The empirical modification relations in Code can not take into account period so they gave empirical modification coefficient for different periods range. But they had not distinguish magnitude and distance.

With the large-scale and important structures, such as nuclear plant, being built in large number, the current aseismic Codes cannot address the requirements in the multi-damping and the long-period aspects. The large amount of recordings in the US NGA project makes it possible for us to study the multi-damping characteristics of acceleration response spectrum in the period range up to 10s.

By the statistical analysis to the 260 recordings selected from the NGA database, as same as the spectra for the damping ratio 0.05, the spectral acceleration attenuation relationships in the period range 0.04-10s are proposed for the damping ratios 0.005, 0.02, 0.07, 0.1, 0.2.

In the following figures, from down to up, the spectra curves means Mw=5, 6, 7, 8.

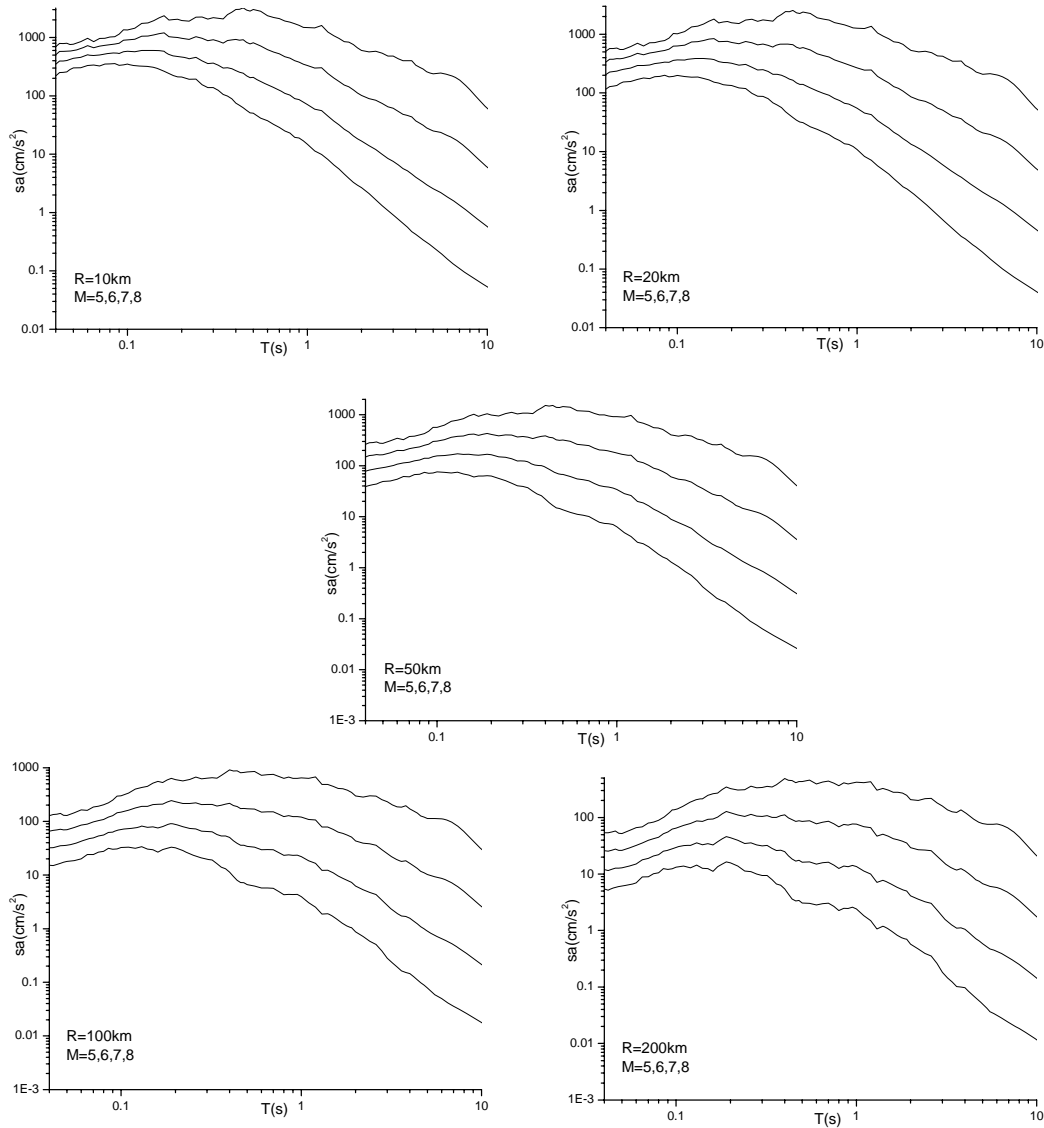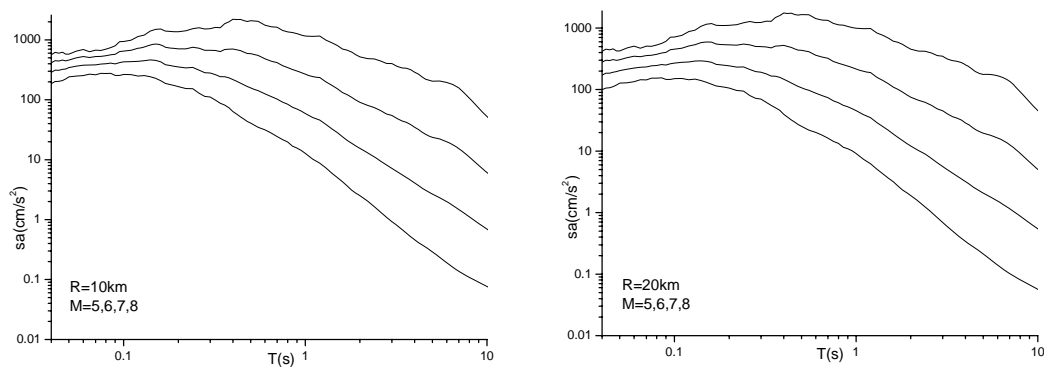## 2. The spectral acceleration attenuation relationships for the damping ratio 0.005

Fig.1 Spectral curves for the damping ratio 0.005

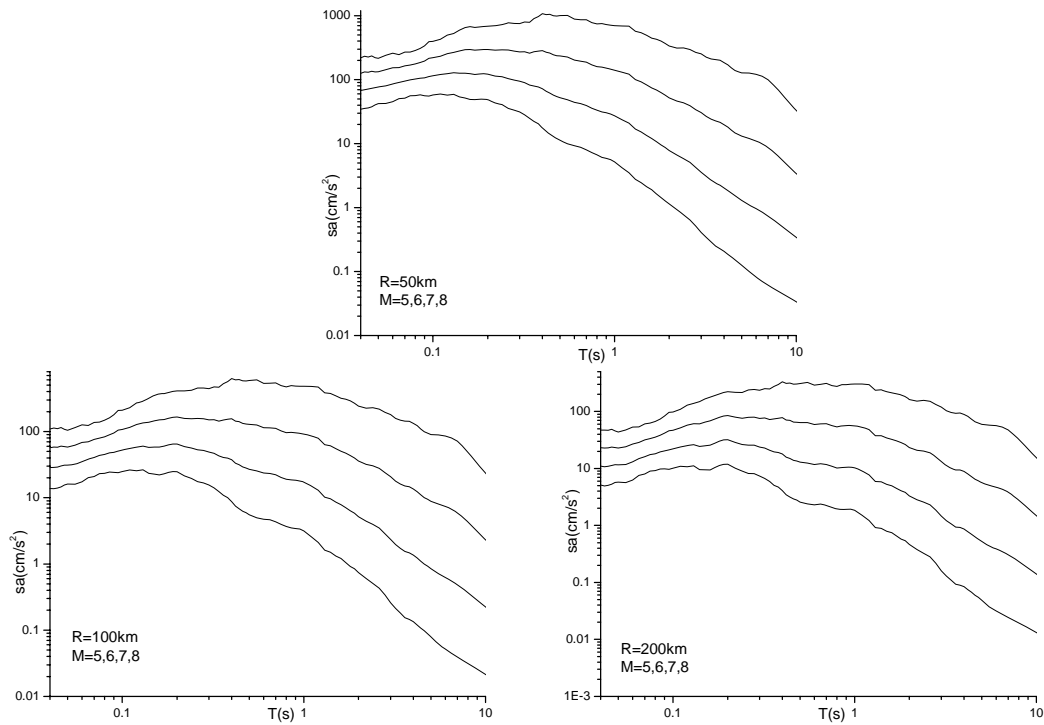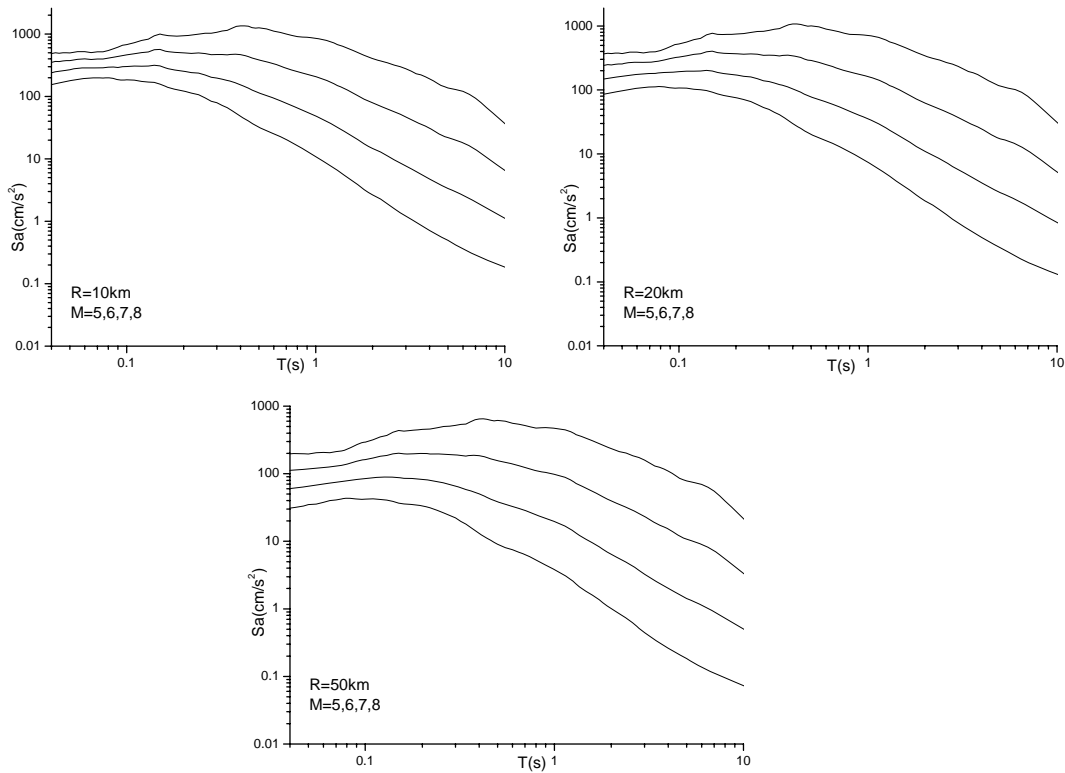## 3. The spectral acceleration attenuation relationships for the damping ratio 0.02

Fig.2 Spectral curves for the damping ratio 0.02

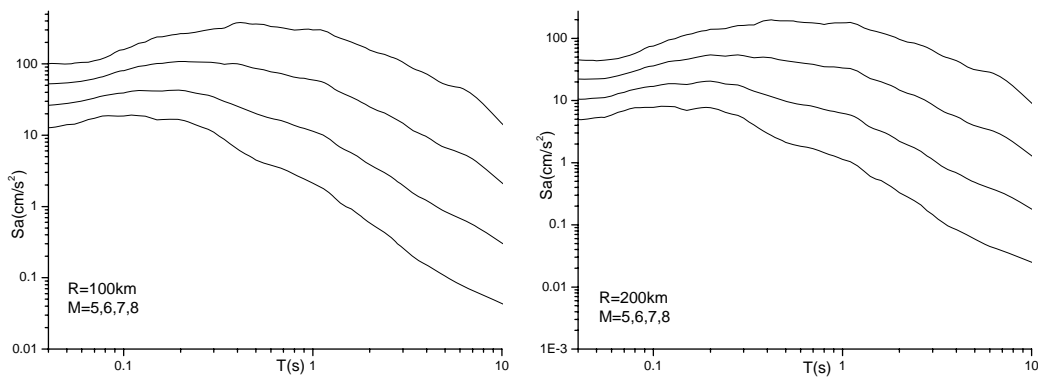## 4. The spectral acceleration attenuation relationships for the damping ratio 0.07

Fig.3 Spectral curves for the damping ratio 0.07

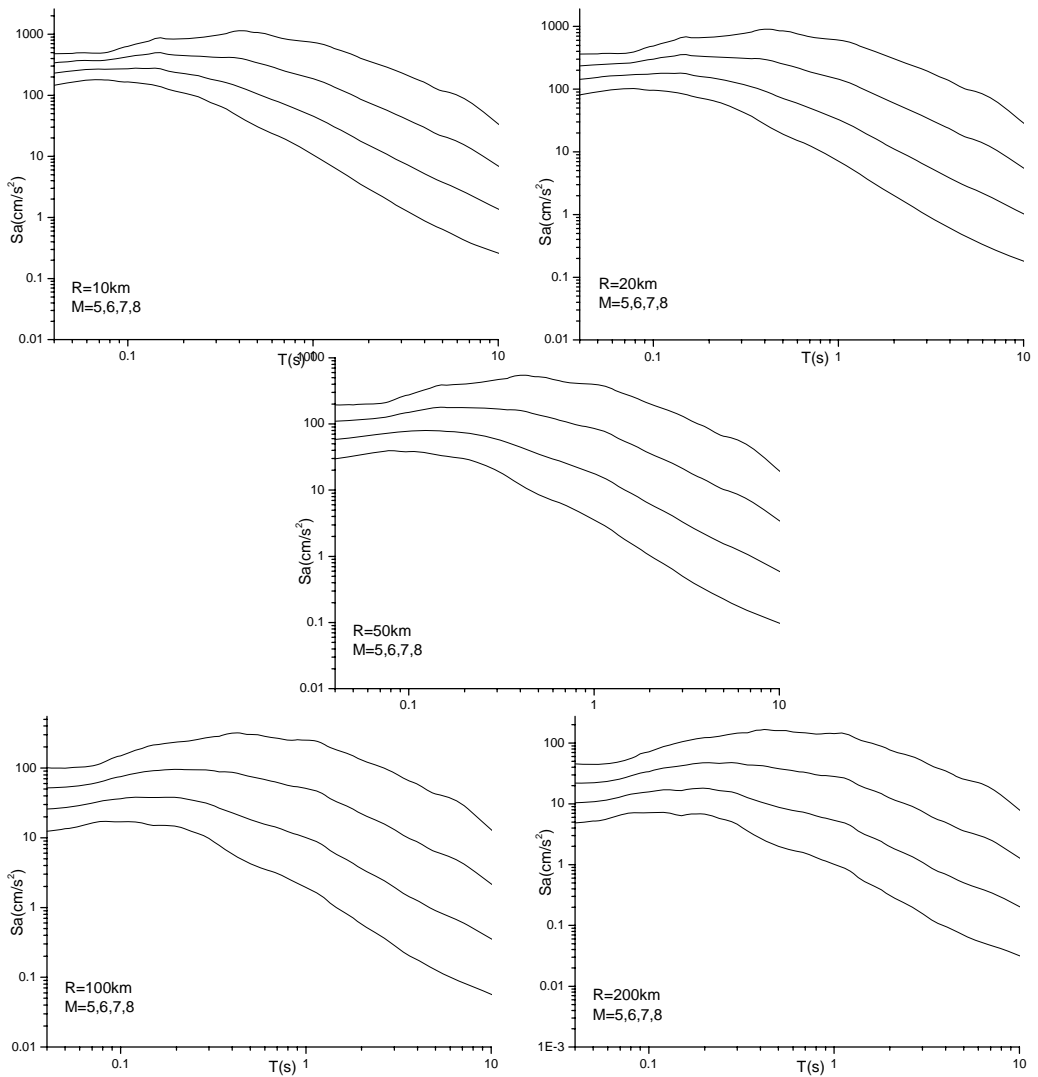## 5. The spectral acceleration attenuation relationships for the damping ratio 0.1

Fig.4 Spectral curves for the damping ratio 0.1

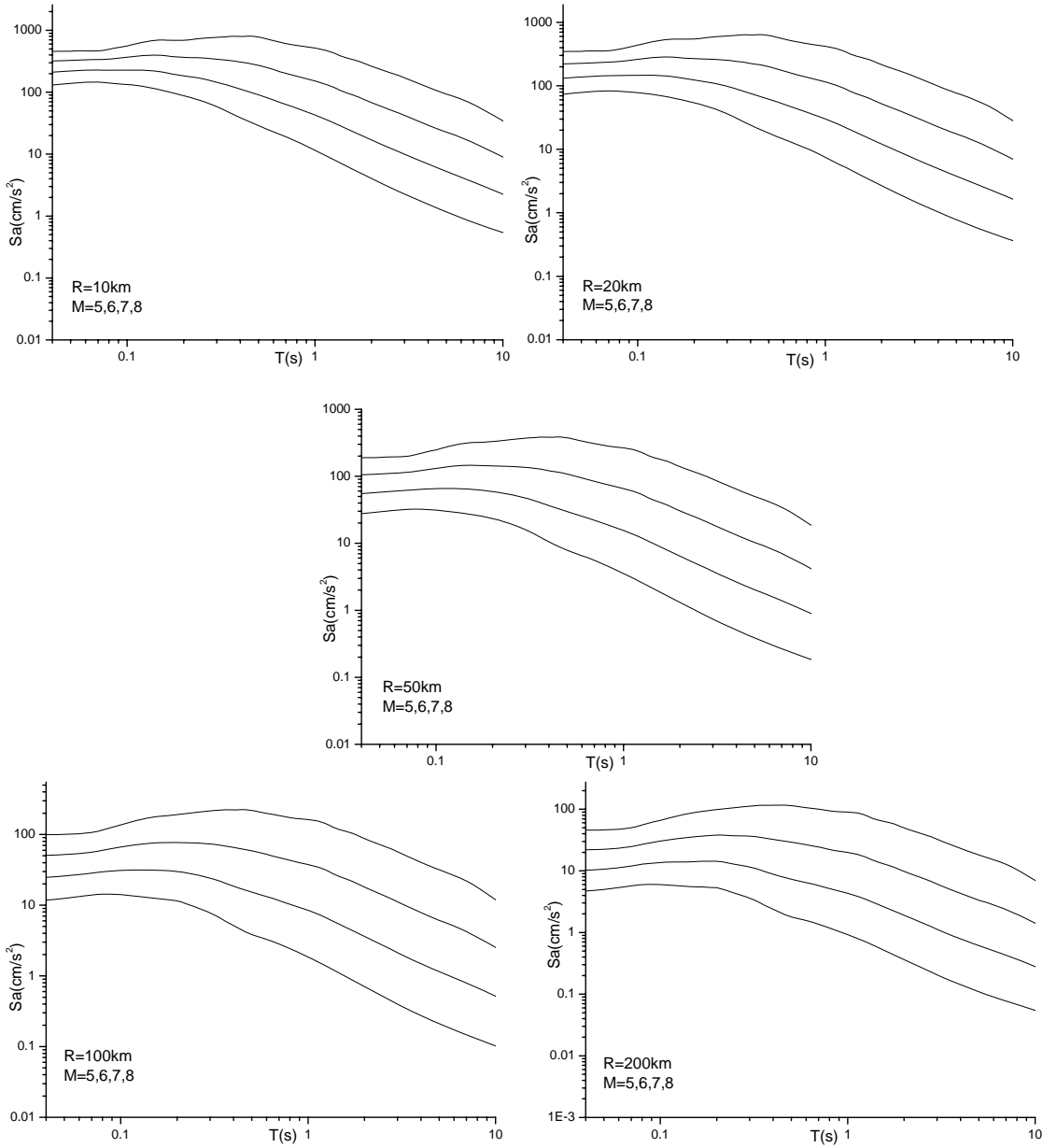**6.The spectral acceleration attenuation relationships for the damping ratio 0.2**

Fig.5 Spectral curves for the damping ratio 0.2

7.ACKNOWLEDGEMENTS

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