**عنوان مقاله:**

assessment of uncertainty in seismic hazard analysis of dams using fuzzy mathematics

**نویسندگان:**

A ANSARI - *Civil Eng. Department, University of Tehran, Iran*

Asa. NOORZAD, - *Civil Eng. Department, University of Tehran, Iran*

Ali NOORZAD - *Chairman, Iranian Committee on Large Dams*

**خلاصه مقاله:**

Our knowledge about earthquake, which is considered as a natural hazard, is highly conjugated with uncertainty. This uncertainty could be categorized into two classes. First, earthquake is a random event. It means that predicting the characteristics of the future seismic motion based on the current information is a matter of randomness, because there is not a comprehensive data from all influencing factors involved in generating seismic motion. From another point of view, not only there is very limited information, but also the available data are not precise. It means that our knowledge about earthquake is vague. This vagueness is not like randomness. For years, probability theory was the only mathematical framework for considering all kind of uncertainties. But by progressing of engineering knowledge and increasing the complexity of problems, it is necessary to study the influence of information fuzziness in the response of dynamic systems. Concerning with the problem of assessment of seismic hazard in dams, there are different sources of uncertainty. The data, upon which the seismicity of a region (i.e. earthquake catalogs and geological information) is determined, have different level of vagueness. For example, the accuracy of magnitude is not identical for all span of the catalog and on the other hand, the geological information is often qualitative and quantifying them brings a great deal of uncertainty. In the present paper, uncertainty of different parameters in magnitude probability density function is modeled by the help of fuzzy mathematics. In this regard, the effects of uncertainty of maximum and minimum magnitude in the catalog in addition to the effect of vagueness of earthquake magnitudes are studied separately. It is concluded that the influence of mmax uncertainty is negligible while this is not the case for m0 which is minimum or threshold magnitude and for magnitude of each event. There is also some kind of uncertainty for the seismicity parameter β which is due to the selection of estimation method. This uncertainty is crucial important and it is shown that it has a drastic influence on the magnitude distribution function. It is also demonstrated that the effect of different parameters' uncertainty is considerable in the low and moderate magnitude range of the catalog.

**کلمات کلیدی:**

Fuzzy mathematics, Uncertainty, Hazard analysis, Seismicity

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