

Additional stress model on the reservoir cross-section caused by water storage fluctuations

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Abstract: Reservoir-induced seismicity (RIS) is an earthquake caused by the change of environment and physical state in the reservoir area and its affected area caused by the change of water conditions after the reservoir is impounded. In the process of reservoir earthquake forming and triggering, rock mass condition, load condition and water occurrence condition have great influence. Therefore, the mechanism of RIS has become the core and difficult problem in RIS research. In particular, the mechanism model of quantifiable calculation and analysis at any point of reservoir and its influence area is lacking. In this paper, considering the additional stress in rock under reservoir bottom caused by reservoir water load, the additional stress model suitable for any location of reservoir were proposed and established. Based on the model, complete calculation of additional stress in reservoir space is realized, the distribution of additional stress on the reservoir section is obtained, and the influence of reservoir shape and size on the additional stress is discussed. The additional stress model of water level fluctuation considering the influence of water storage and drainage is established, then, the distribution of additional stress and the influence of water level fluctuation on induced seismic are analyzed, and a more simplified and general theory of additional stress coefficients is established. The results show that the variation of water level has a significant effect on the additional stress, and the increase of water level will lead to the increase of additional stress.

Key words: reservoir-induced seismicity; cross section model of reservoir; additional stress of reservoir water; water level fluctuation