AOGS 2005

CRUSTAL STRESS ANALYSIS OF KOYNA REGION, WESTERN MAHARASHTRA, INDIA, USING GPS

NISHA RADHAKRISHNAN[1], MADHAV N. KULKARNI[2]
[1]*Research Scholar, Department of Civil Engineering*
[2]*Professor, Department of Civil Engineering,Indian Institute of Technology Bombay, India*

Continuous monitoring and in-depth analysis of the crustal strain accumulating in a region is an important step in understanding the earthquakes phenomenon. Seismic movement is a mechanism for accommodating large-scale motion of the underlying rocks along a fault line. As the rocks slide past each other, relative motion is sometimes accommodated by a relatively constant gradual slip; while at other times, the accumulated strain is released in the form of earthquakes. Stress builds up on a fault plane until it reaches the breaking strength of the rock. Then, when an earthquake or slip occurs, the stress is released and a new cycle begins. The deformation of the crust by a slip on a fault plane generates an elastic strain field surrounding the fault. This release in stress can be estimated using deformation monitoring methods.

Deformation monitoring methods have been broadly classified into physical and geodetic techniques. With the advancements in space technology, in the recent years, deformation monitoring and measurements have been done using Global Positioning System (GPS).

The paper gives a broad overview of how GPS is used for deformation monitoring due to seismic activity by calculating strain accumulated and released. A detailed study on the application of GPS in monitoring deformation of the Koyna region, Western Maharashtra, India is presented. The GPS Group at the Indian Institute of Technology Bombay has been working in the field of deformation measurements and analysis of Koyna Dam and its surroundings (including a fault zone in the vicinity of the dam). A GPS network has been established for this purpose, and observed over ten epochs, from December 2000 to September 2004, in order to investigate the potential of the GPS Technology in deformation measurement analysis. This paper helps in understanding the process of deformation along the fault line at Koyna, the crustal strain rates between the campaigns have been and can be used as an indicator of any seismic activity in the area.

Keywords: Global Positioning System (GPS); Structural Deformation; Koyna Dam; Reservoir water level; Seismic activity; Strain rates; Fault zone.