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Feasibility of Using MEMS Technology for Monitoring Large Earthquakes

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Small low-cost microelectromechanical system (MEMS) triaxial sensors provide ground-acceleration measurements of moderate to large earthquakes. However, the common challenge of such sensors are low dynamic range which is because of high self noise of these systems. In this paper, a new configuration for reducing self-noise of MEMS acceleration sensors is provided. Using this configuration, a three-axial acceleration sensor was build. Five sensors of this type were installed at a concrete dam to monitor the response of the dam against large earthquake. During 12 November 2017 Mw 7.3 Sarpol-e Zahab (Iran–Iraq Border) earthquake, this system recorded the earthquake in different locations of the dam. In this paper, the results of such recordings are presented. Moreover, the results of shaking table tests of this acceleration recording system collocated with other acceleration sensors are also presented. The results shows that new configuration of MEMS acceleration sensors could be used to record the seismic motion of large earthquakes.

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