



Scaling relationship between rotation and translation motions

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Rotation motion and its effects are not well known and our knowledge about translation motions is much better than that of the rotation motions. Since rotation motions show to have a close relationship with translation motions, deriving such relationship might improve our understanding on rotation motions. Rotation motion can be obtained by taking a spatial derivative of translation motion. Therefore, rotation motion is always accompanied by translation motions. Although rotation motion cannot be detected by strong motion record, the rotation-induced centrifugal acceleration and gravity effects are recorded in a strong-motion record. In this study we derive empirical relationships for rotation motion and its effects. Results show that rotation motion and its effects are small and can be ignored in weak motion, but they grow up very fast as the increasing of translation motion and become important in near-fault ground motions. We also found that those abnormal strong-motion records observed in near-fault are closely related to rotation motions.