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STRONG GROUND MOTION IN THE VERY NEAR FIELD AS AN EXAMPLE OF THE 2008 IWATE-MIYAGI EARTHQUAKE

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The extreme ground motion in the near field is actually an engineering interest, because important damages are observed even if any standard construction code is applied. Such extreme ground motion is identified by a PGV (Peak Vround Velocity) more than 100 cm/s or a PGA (Peak Ground Acceleration) more than 800 gal (cm/s/s), for instance (Kawase, JAEE, 1998). The 2008 Mw6.9 Iwate-Miyagi, Japan, earthquake is remembered for the maximum recorded acceleration of 3800 gal at the surface sensors of the station IWTH25 (Kik-net, NIED) located above the ruptured thrusting fault plane. An acceleration of more than 1000 gal is observed even at the borehole sensor (280 m depth) at the same station. The PGV also reaches about 100 cm/s. We focus on the fact that an extreme ground motion is found even at depth, and this should be originated from the source process. In particular, the PGV is found at the very beginning of the ground motions, about 2 seconds after the arrival of S wave, as the first main pulse. We study the mechanics of this strong ground motion, supposing that there might have been related to some very local heterogeneity of the source process. We compute the wave propagation from the published kinematic source models, but due to the resolution limit of the inversion model, the strong first pulse is hardly reproduced in terms of its huge amplitude and short duration. Then we try to simulate the beginning of the rupture process (about the first 3 seconds) kinematically and dynamically. We still encounter two difficulties: The station is unfavorably located with respect the S-wave radiation from the supposed fault plane, and the dynamic model is difficult to give a strong heterogeneity in the beginning without affecting significantly the later rupture process.