



TEMPORAL CHANGE OF S-WAVE PROPAGATION TIME OBSERVED AT THE KIK-NET ICHINOSEKI-NISHI SITE DURING, BEFORE, AND AFTER THE 2008 IWATE-MIYAGI NAIRIKU EARTHQUAKE

Hidenori MOGI¹, Santa Man SHRESTHA², Hideji KAWAKAMI³ and Junya KAWAMURA⁴

¹Member of JAEE, Associate Professor, Saitama University, Saitama, Japan,
hmogi-2008f@kiban.civil.saitama-u.ac.jp

²PhD Student, Saitama University, Saitama, Japan,
santa@kiban.civil.saitama-u.ac.jp

³Member of JAEE, Professor, Saitama University, Saitama, Japan,
kaw@kiban.civil.saitama-u.ac.jp

⁴Ex-student, Saitama University, Saitama, Japan.

ABSTRACT: The 2008 Iwate-Miyagi Nairiku earthquake caused severe damage in the southern part of Iwate and the northern part of Miyagi Prefectures. The KiK-net Ichinoseki-Nishi observation site, operated by the National Research Institute for Earth Science and Disaster Prevention, is situated near the epicenter. The vertical array records observed at the site provide valuable information about the wave propagation at a large strain level. In this study, the temporal changes of S-wave propagation time were examined based on the Normalized Input-Output Minimization (NIOM) analysis. The NIOM analyses were carried out for the vertical array records observed during the mainshock and the events before and after it. The results revealed that (1) the S-wave propagation time increased from 0.258 s to about 0.35 s due to nonlinear behavior of the soil; (2) this propagation time corresponds to the 60% reduction of the shear moduli of the surface layers (ground—64 m depth) and the strain level of 1×10^{-3} ; and (3) the propagation time after the mainshock was still larger than the observed propagation time before the mainshock, and gradual decrease of the propagation time was observed during six months after the mainshock.

Key Words: The 2008 Iwate-Miyagi Nairiku Earthquake, Propagation Time of S Wave, Temporal Change, Nonlinear behavior, NIOM Analysis, Earthquake Ground Motion