CLAIM

[Claim 1]

A rapid load test method for a pile, in which a weight is dropped onto a pile head to determine a static load-displacement relation of the pile from a relation between a load caused by the drop of said weight and a displacement of said pile head, wherein the rapid load test method comprises:

conducting a plurality of rapid load tests on said pile head in the manner of changing the drop height h of said weight,

determining soil resistance R_{soil} to the pile under receiving a blow, in order of the following procedures (a) and (b) according to a Case method based on one-dimensional wave propagation theory, for each of the plurality of rapid load tests,

determining a relation between a displacement w of said pile head and said soil resistance R_{soil} from temporal changes of the directly measured displacement w of said pile head,

determining an unloading point load P_h and an unloading point displacement w_h by assuming that the soil resistance $R_{soil(max)}$ as of the maximum displacement w_{max} is being static resistance R_w, and

determining a pile head load P_h-pile head displacement w_h relation resulting from connecting said unloading point load P_h and said unloading point displacement w_h, respectively obtained for each different drop height h,

(a) calculating a downward traveling wave F_d and an upward traveling wave F_u from axial force F and pile velocity v in the rapid load test by using the following equations (5) and (6),

[Equation 5]

$$F_{\mathrm{d}}(x_{\mathrm{m}},t)=\frac{F(x_{\mathrm{m}},t)+Z\bullet v(x_{\mathrm{m}},t)}{2} \qquad (5)$$

[Equation 6]

$$F_{\mathrm{u}}(x_{\mathrm{m}},t)=\frac{F(x_{\mathrm{m}},t)-Z\bullet v(x_{\mathrm{m}},t)}{2} \qquad (6)$$

(b) Subsequently, obtaining the temporal changes of the soil resistance R_{soil} to the pile by using the following equation (7),

[Equation 7]

$$R_{\text{soil}}(x_{\text{m}},t)=F_{\text{d}}\left(x_{\text{m}},t-\frac{L_{\text{m}}}{c}\right)+F_{\text{u}}\left(x_{\text{m}},t+\frac{L_{\text{m}}}{c}\right) \tag{7}$$

wherein x is coordinate along a pile axis (with the pile head set to be 0), x_m is measurement position, v is pile velocity, L_m is length from the measurement position to a pile tip, F is axial force, F_d is downward traveling wave, F_u is upward traveling wave, Z is impedance (EA/c) of a pile body, c is longitudinal wave velocity, E is Young's modulus of a pile material, A is cross-sectional area of the pile, and R_{soil} is soil resistance.