

ABSTRACT

METHOD FOR PREDICTING FRICTIONAL RESISTANCE OF ROUGH SURFACE,
AND APPARATUS FOR ESTIMATING SURFACE PERFORMANCE

15 [Object]

The invention provides a method which predicts a ratio of the increase in frictional resistance of a rough surface in a simple manner, quickly and without variations in predicted results among individuals.

20 [Solution]

The method for predicting the frictional resistance of a rough surface having a variation in roughness wavelength, and being in contact with a fluid flowing at varied velocities includes evaluating the total projected area A of all prominent
25 peaks standing out above the viscous sublayer thickness per unit area (hereinafter, written as the "prominent peak projected area A"), and calculating the friction increase ratio FIR (%) using Equation (1) below or the frictional resistance increase $\Delta\tau$ using Equation (2) below.

$$\text{FIR}(\%) = C \times A \quad (1)$$

$$\Delta\tau = C_r \frac{1}{2} \rho A V^2 \quad (2)$$

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(In Equation (1), the coefficient C is a constant dependent on the prominent peak projected area A and is determined by performing a frictional resistance test beforehand in which the frictional resistance is measured with respect to a
35 plurality of rough surfaces differing in the degree of roughness while changing the flow velocity V and the friction increase ratios FIR (%) of the rough surfaces are calculated wherein the friction increase ratios FIR (%) are percentages of the difference $\tau_r - \tau_0$ between the frictional resistance τ_r of the
40 rough surface and the frictional resistance τ_0 of a smooth surface, divided by τ_0 . In Equation (2), the coefficient C_r is a constant dependent on the fluid density ρ , the prominent peak projected area A and the flow velocity V and is determined from the relation of Equation (2) using values of frictional
45 resistance increase $\Delta\tau$ obtained beforehand by a frictional resistance test in which the frictional resistance is measured with respect to a plurality of rough surfaces differing in the degree of roughness while changing the flow velocity V wherein the values of frictional resistance increase $\Delta\tau$ are the
50 differences $\tau_r - \tau_0$ between the frictional resistance τ_r of the rough surface and the frictional resistance τ_0 of a smooth surface.)