

Abstract Submitted  
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**High Reynolds number examination for fully developed pipe flow - Mean velocity profile and friction factor** NORIYUKI FURUICHI, AIST, NMIJ, YUKI WADA, YOSHIYUKI TSUJI, Nagoya Univ., YOSHIYA TERAOKA, AIST, NMIJ — The pipe flow examinations at high Reynolds numbers up to  $Re=18,000,000$  are performed using the high Reynolds number actual flow facility Hi-Reff at AIST, NMIJ. The precise measurements of the friction factor and velocity profile are achieved by the highly accurate measurement of the flow rate. The friction factor data is obviously different from the Prandtl equation and the experimental results from the Superpipe at Princeton University. The deviation from the Superpipe is -6% at  $Re=10,000,000$ . The velocity profile is measured by LDV. The consistency between the mean velocity profile and the friction factor measured is investigated. The velocity profile data is fitted to a velocity profile form based on the log law, and an equation for the friction factor is derived by integration. The derived equation for the friction factor accurately represents the friction factor data. The deviation from the friction factor data is less than 1%. Based on the equations for the friction factor derived using the mean velocity profile, the best-fitting constants for the friction factor data are also proposed. For the high Reynolds number region, the Karman constant given by the velocity profile and the friction factor is completely consistent and it is 0.383.

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