Erratum: "Friction factor directly from transitional roughness in a turbulent pipe flow" [ASME Trans. J. Fluid Eng., 2007, 129, pp. 1255–1267]

Noor Afzal

Introduction

(1) Page: 1258: In friction factor relations (34), (35), (36), and (37), replace δ by D in first location, to read as

$$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{2.51}{Re\sqrt{\lambda}} + \frac{h}{3.7D}\exp\left(-j\frac{5.66}{Re\sqrt{\lambda}}\frac{\delta}{h}\right)\right] \quad (34)$$

$$\frac{1}{\sqrt{\lambda}} = -1.93\log_{10}\left[\frac{1.90}{Re\sqrt{\lambda}} + \frac{h}{3.7D}\exp\left(-j\frac{5.66}{Re\sqrt{\lambda}}\frac{\delta}{h}\right)\right] \quad (35)$$

$$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{5.74}{Re^{0.9}} + \frac{h}{3.7D}\exp\left(-j\frac{12.91}{Re^{0.9}}\frac{\delta}{h}\right)\right] \quad (36)$$

$$\frac{1}{\sqrt{\lambda}} = -1.932\log_{10}\left[\frac{4.22}{Re^{0.9}} + \frac{h}{3.7D}\exp\left(-j\frac{9.50}{Re^{0.9}}\frac{\delta}{h}\right)\right] \quad (37)$$

(2) Page 1259: In Table 1, replace δ by D in the second column, and its corresponding term in the third column. Also in the third column of Eqs. (3a) and (3b*), the numerical values 0.754 and 1.724 are replaced by 0.88 and 2.02, respectively. The corrected Table 1 is given below.

Table 1 Roughness scale and friction factors in fully rough and transitional rough pipes

Scale	Friction factor for fully rough pipes	Friction factor for transitional rough pipes implicit and approximate explicit expressions; ($j = 11$)[a]	Eq.
R_q	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left(\frac{R_q}{0.7D}\right)$	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{2.51}{\mathrm{Re}\sqrt{\lambda}} + \frac{R_q}{0.7D}\exp\left(-j\frac{1.062}{\mathrm{Re}\sqrt{\lambda}}\frac{\delta}{R_q}\right)\right]$	(1a)
$h_s = 5.333R_q$		$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{5.74}{\mathrm{Re}^{0.9}} + \frac{R_q}{0.7D}\exp\left(-j\frac{2.58}{\mathrm{Re}^{0.9}}\frac{\delta}{R_q}\right)\right]$	(1b*)
R_Z	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left(\frac{R_Z}{3D}\right)$	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{2.51}{\mathrm{Re}\sqrt{\lambda}} + \frac{R_Z}{3D}\exp\left(-j\frac{4.55}{\mathrm{Re}\sqrt{\lambda}}\frac{\delta}{R_Z}\right)\right]$	(2a)
$h_s = 1.244R_Z$		$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{5.74}{\mathrm{Re}^{0.9}} + \frac{R_Z}{3D}\exp\left(-j\frac{10.41}{\mathrm{Re}^{0.9}}\frac{\delta}{R_Z}\right)\right]$	(2b*)
R_a	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left(\frac{R_a}{0.57D}\right)$	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{2.51}{\mathrm{Re}\sqrt{\lambda}} + \frac{R_a}{0.57D}\exp\left(-j\frac{0.88}{\mathrm{Re}\sqrt{\lambda}}\frac{\delta}{R_a}\right)\right]$	(3a)
$h_s = 6.45R_a$		$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{5.74}{\mathrm{Re}^{0.9}} + \frac{R_a}{0.57D}\exp\left(-j\frac{2.02}{\mathrm{Re}^{0.9}}\frac{\delta}{R_a}\right)\right]$	(3b*)
R_q/H	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left(\frac{R_q/H}{0.5D}\right)$	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{2.51}{\mathrm{Re}\sqrt{\lambda}} + \frac{R_q/H}{0.5D}\exp\left(-j\frac{0.754}{\mathrm{Re}\sqrt{\lambda}}\frac{\delta}{R_q/H}\right)\right]$	(4a)
$h_s = 7.71R_q/H$		$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{5.74}{\mathrm{Re}^{0.9}} + \frac{R_q/H}{0.5D}\exp\left(-j\frac{1.724}{\mathrm{Re}^{0.9}}\frac{\delta}{R_q/H}\right)\right]$	(4b*)
h	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left(\frac{h}{3.7D}\right)$	$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{2.51}{\mathrm{Re}\sqrt{\lambda}} + \frac{h}{3.7D}\exp\left(-j\frac{5.66}{\mathrm{Re}\sqrt{\lambda}}\frac{\delta}{h}\right)\right]$	(5a)
		$\frac{1}{\sqrt{\lambda}} = -2\log_{10}\left[\frac{5.74}{\mathrm{Re}^{0.9}} + \frac{h}{3.7D}\exp\left(-j\frac{12.91}{\mathrm{Re}^{0.9}}\frac{\delta}{h}\right)\right]$	(5b*)
h	$\frac{1}{\sqrt{\lambda}} = -1.93\log_{10}\left(\frac{h}{3.7D}\right)$	$\frac{1}{\sqrt{\lambda}} = -1.93\log_{10}\left[\frac{2.51}{\mathrm{Re}\sqrt{\lambda}} + \frac{h}{3.7D}\exp\left(-j\frac{5.66}{\mathrm{Re}\sqrt{\lambda}}\frac{\delta}{h}\right)\right]$	(6a)
		$\frac{1}{\sqrt{\lambda}} = -1.93\log_{10}\left[\frac{4.22}{\mathrm{Re}^{0.9}} + \frac{h}{3.7D}\exp\left(-j\frac{9.50}{\mathrm{Re}^{0.9}}\frac{\delta}{h}\right)\right]$	(6b*)

Note: $\delta = a = D/2 =$ pipe radius or semi-depth of channel.
$h =$ Equivalent sand grain roughness.
$R_q =$ Root mean square (rms) roughness, $R_Z =$ Mean peak to valley heights roughness.
$R_a =$ Arithmetic mean roughness, $R_q/H =$ Height-Texture (HT) roughness.
[a]Explicit approximate friction factor Eqs. (1b*)–(5b*) with $A = 2$ based on approximate smooth pipe Eq. (38), and approximate explicit friction factor Eq. (6b*) with $A = 1.93$ based on Eq. (39).

