
PROBLEM 10-7N QUESTION

Reynolds Analogy And Equivalent Diameter Problem

Consider a uniformly heated tube (constant heat flux) of diameter 0.025m with fluid flowing at an average velocity of 0.5m/s. Find the fully developed heat transfer coefficient for two different fluids (Fluid A and Fluid B, whose properties are given in Table I) by the following two procedures:

Procedure #1 – Use only friction factor data. If you find this procedure not valid, state the reason.

Procedure #2 – Select the relevant heat transfer correlation.

In summary, you are asked to provided four answers, i.e.,

	FLUID A	FLUID B
PROCEDURE #1	$h = ?$	$h = ?$
PROCEDURE #2	$h = ?$	$h = ?$

TABLE I

FLUID PROPERTIES	FLUID A	FLUID B
$k \quad \text{W/m}^\circ\text{C}$	0.5	63
$\rho \quad \text{kg/m}^3$	700	818
$\mu \quad \text{kg/ms}$	8.7×10^{-5}	2.3×10^{-4}
$C_p \quad \text{J/kg}^\circ\text{C}$	6,250	1,250