

LAMPIRAN CONTOH PERHITUNGAN

1. Viskositas :

$$\begin{aligned} \mu_{nf} &= (1 + 2,5 \times 0,001 \text{ kg/m.s}) 0,001 \text{ kg/m.s} \\ &= 0,001 \text{ Ns/m}^2 \end{aligned}$$

2. Densitas :

$$\begin{aligned} \rho_{nf} &= 0,001 \text{ kg/m.s} \times 6000 \text{ kg/m}^3 + (1-0,001 \text{ kg/m.s}) \times 997 \text{ kg/m}^3 \\ &= 1,002 \text{ kg/m}^3 \end{aligned}$$

3. Panas spesifik :

$$\begin{aligned} Cp_{nf} &= \frac{(1-0,001 \text{ Kg/m.s}) \times (997 \text{ Kg/m}^3 \times 4170 \text{ J/ Kg.K}) + 0,001 \text{ Kg/m.s} \times (6000 \text{ Kg/m}^3 \times 551 \text{ J/Kg.K})}{(1-0,001 \text{ Kg/m.s}) \times 997 \text{ Kg/m}^3 + 0,001 \text{ Kg/m.s} \times 6000 \text{ Kg/m}^3} \\ &= 4153,3 \text{ J/Kg.K} \end{aligned}$$

4. Konduktivitas Termal :

$$\begin{aligned} K_{nf} &= \frac{383 \text{ W/m.k} + 0,59 \text{ W/m.k} + 2 (383 \text{ W/m.k} - 0,59 \text{ W/m.k}) 0,001}{383 \text{ W/m.k} + 2 \times 0,59 \text{ W/m.k} - (383 \text{ W/m.k} - 0,59 \text{ W/m.k}) 0,001} \\ &= 0,59086 \text{ W/m.k} \end{aligned}$$

5. Reynolds Number :

$$9350 = \frac{6000 \text{ Kg/m.s} \times v \times 0,08 \text{ m}}{0,001 \text{ Ns/m}^2}$$

$$0,001 \text{ Ns/m}^2$$

$$\begin{aligned} V &= 6000 \text{ Kg/m.s} \times 0,08 \text{ m} = 480 \\ &= 9350 \times 0,001 \text{ Ns/m}^2 = 9,35 \\ &= 51,336 \end{aligned}$$

LAMPIRAN TABEL PERHITUNGAN

Tabel 1. Perhitungan sintesis CuO/Air

Properti termofisik	Volume fraksi (%)				
	0%	0,1%	0,5%	1%	1,5%
Density, (ρ) m^3/kg	997	1002	1022,02	1047,03	1072,05
Specific heat, (C_p) $J/kg.k$	4170	4148,33	4063,77	3962,61	3866,18
Termal konduktivitas, k $w/m.k$	0,59086	0,59086	0,59794	0,60688	0,61591
Viskositas dinamis, (μ) $pa.s$	0,001	0,00101	0,00102	0,00103	0,00104

Tabel 2. Perhitungan kecepatan pada inlet pipa radiator

Re	Kecepatan inlet v (m/s)				
	0%	0,1%	0,5%	1%	1,5%
9350	0,11758	0,11728	0,11613	0,11476	12,1988
13800	0,17354	0,1731	0,17141	0,16938	1,80046
18500	0,23264	0,23206	0,22978	0,22706	2,2447
23000	0,28923	0,28851	0,28568	0,2823	2,7907

Tabel 3. Nilai referensi

LOKASI	INLET	OUTLET	WALL
Kecepatan	Lihat tabel 3.4	-	-
Intensitas sedang	5%	-	-
Suhu statis	293K	-	-
Tekanan relatif	-	1 Pa	-
Fluks panas	-	-	1000 w/m^2k
Pilihan	-	-	No slip wall

Tabel 4. Tabel perhitungan pada variasi 0.1% ANSYS

Reynolds number	Nusselt number	Heat transfer
9350	77.6519	5832.19
13800	107.683	8087.75
18500	137.221	10306.2
23000	164.966	12390.1

Tabel 5. Tabel perhitungan pada variasi 0.5% ANSYS

Reynolds number	Nusselt number	Heat transfer
9350	78.5006	5895.94
13800	108.66	8161.15
18500	138.847	10428.4
23000	167.117	12551.7

Tabel 6. Tabel perhitungan pada variasi 1% ANSYS

Reynolds number	Nusselt number	Heat transfer
9350	80	6019.71
13800	111.237	8354.69
18500	136.785	10273.5
23000	164.176	12330.8

Tabel 7. Tabel perhitungan pada variasi 1.5% ANSYS

Reynolds number	Nusselt number	Heat transfer
9350	820.926	6165.72
13800	113.986	8561.13
18500	136.993	10289.1
23000	164.589	12361.8