

Comment

Comment on Alruwaele, W.H.R.; Gajjar, J.S.B. Lid-Driven Cavity Flow Containing a Nanofluid. *Dynamics* 2024, 4, 671–697

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First error

In ref. [1], the base fluid is water, and Table 1 in ref. [1] shows that the water density is $\rho = 997.1$ (kg/m³) and the thermal expansion coefficient is $\beta = 2.1 \times 10^{-4}$ (K⁻¹) (the term thermal conductivity coefficient in Table 1 in ref. [1] is wrong; the correct term is thermal expansion coefficient).

However, from Table 1, it can be seen that the density $\rho = 997.1$ (kg/m³) corresponds to a temperature of 25 °C, and at this temperature, the corresponding thermal expansion coefficient is $\beta = 2.6 \times 10^{-4}$ (K⁻¹).

Table 1. Water properties at different temperatures (Bejan [2]).

T (°C)	ρ (g/cm ³)	μ (g/cm·s)	c_p (kJ/kg·K)	k (W/m·K)	Pr	β (K ⁻¹)
0	0.9999	0.01787	4.217	0.56	13.44	-0.6×10^{-4}
5	1	0.01514	4.202	0.57	11.13	$+0.1 \times 10^{-4}$
10	0.9997	0.01304	4.192	0.58	9.45	0.9×10^{-4}
15	0.9991	0.01137	4.186	0.59	8.13	1.5×10^{-4}
20	0.9982	0.01002	4.182	0.59	7.07	2.1×10^{-4}
25	0.9971	0.00891	4.179	0.60	6.21	2.6×10^{-4}
30	0.9957	0.00798	4.178	0.61	5.49	3.0×10^{-4}
35	0.9941	0.00720	4.178	0.62	4.87	3.4×10^{-4}
40	0.9923	0.00654	4.178	0.63	4.34	3.8×10^{-4}
50	0.9881	0.00548	4.180	0.64	3.57	4.5×10^{-4}
60	0.9832	0.00467	4.184	0.65	3.01	5.1×10^{-4}
70	0.9778	0.00405	4.189	0.66	2.57	5.7×10^{-4}
80	0.9718	0.00355	4.196	0.67	2.23	6.2×10^{-4}
90	0.9653	0.00316	4.205	0.67	1.98	6.7×10^{-4}
100	0.9584	0.00283	4.216	0.68	1.78	7.1×10^{-4}



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The error is 19%. Equation (9) in ref. [1] is as follows:

$$(\rho\beta)_m = \phi\rho_p\beta_p + (1 - \phi)\rho_f\beta_f \quad (1)$$

The wrong thermal expansion coefficient of water (β_f) influences the expansion coefficient β_m in Equation (1) and both β_m, β_f influence the last term $Ri_{\beta_f}^{\beta_m} \frac{\partial T}{\partial x}$ in Equation (4) in ref. [1]. Thus, the error is transferred to the results.

Second error

Above Section 4, in the Results and Discussion section in ref. [1], it is written that the results in ref. [1] were produced for the Prandtl number $Pr = 6.9$. However, from Table 1, it can be seen that at the density $\rho = 997.1 \text{ (kg/m}^3\text{)}$, the corresponding Prandtl number is $Pr = 6.21$. The error is 11%.

Conflicts of Interest: The author declares that he has no competing interests.

References

1. Alruwaele, W.H.R.; Gajjar, J.S.B. Lid-Driven Cavity Flow Containing a Nanofluid. *Dynamics* **2024**, *4*, 671–697. [[CrossRef](#)]
2. Bejan, A. *Convection Heat Transfer*, 4th ed.; John Wiley & Sons: Hoboken, NJ, USA, 2013.

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