Erratum: Mixed convection in a partially and differentially heated cavity − a finite volume complete flux analysis

It has come to the attention of the publisher that article Rathish Kumar, B.V., and Pandey, C. (2025), "Mixed convection in a partially and differentially heated cavity − a finite volume complete flux analysis". *International Journal of Numerical Methods for Heat & Fluid Flow*, Vol. 35 No. 8 pp. 2788–2812, https://doi.org/10.1108/HFF-09-2024-0678, had errors in several equations with incorrect brackets/parentheses, overlapping numbers, extra symbol within the mathematical and inline equations which is now corrected.

The table below provides details of the affected equations which have now been corrected in the PDF:

Table 1.

Equation no.	Incorrect equation
1a	$\nabla \cdot \mathrm{u} = 0, \psi$
1b	$\frac{\partial u}{\partial t} + \nabla \cdot \boldsymbol{f}^u = -\frac{\partial p}{\partial x}, \psi$
1c	$\frac{\partial v}{\partial t} + \nabla \cdot \boldsymbol{f}^v = -\frac{\partial p}{\partial y} + \frac{\mathrm{Gr}}{\mathrm{Re}^2}\theta, \psi$
1d	$\frac{\partial \theta}{\partial t} + \nabla \cdot \boldsymbol{f}^\theta = 0, \psi$
1e	$\boldsymbol{f}^u = \left(u^2 - \frac{1}{\mathrm{Re}}\frac{\partial u}{\partial x}\right)\boldsymbol{e}_1 + \left(vu - \frac{1}{\mathrm{Re}}\frac{\partial u}{\partial y}\right)\boldsymbol{e}_2, \psi$
1f	$\boldsymbol{f}^v = \left(uv - \frac{1}{\mathrm{Re}}\frac{\partial v}{\partial x}\right)\boldsymbol{e}_1 + \left(v^2 - \frac{1}{\mathrm{Re}}\frac{\partial v}{\partial x}\right)\boldsymbol{e}_2, \psi$
1g	$\boldsymbol{f}^\theta = \left(u\theta - \frac{1}{\mathrm{RePr}}\frac{\partial \theta}{\partial x}\right)\boldsymbol{e}_1 + \left(v\theta - \frac{1}{\mathrm{RePr}}\frac{\partial \theta}{\partial y}\right)\boldsymbol{e}_2, \psi$
2a	$\frac{u_{j+1/2,k} - u_{j-1/2,k}}{\Delta x} + \frac{v_{j,k+1/2} - v_{j,k-1/2}}{\Delta y} = 0, \psi$
2b	$\dot{u}_{j+1/2,k} + \frac{1}{\Delta x} F^u_{1j+1,k} - F^u_{1j,k} \Bigg) + \frac{1}{\Delta y} F^u_{2j+1/2,k+1/2} - F^u_{2j+1/2,k-1/2} \Bigg) = -\frac{p_{j+1,k} - p_{j,k}}{\Delta x},$
2c	$\dot{v}_{j,k+1/2} + \frac{1}{\Delta x} F^v_{1j+1/2k+1/2} - F^v_{1j-1/2k+1/2} \Bigg) + \frac{1}{\Delta y} F^v_{2j,k+1} - F^v_{2j,k} \Bigg) = -\frac{p_{j,k+1} - p_{j,k}}{\Delta y}$ $+ \frac{Gr}{\mathrm{Re}^2}\widetilde{\theta}_{j,k+1/2}$
2d	$\dot{\theta}'_{j,k} + \frac{1}{\Delta x} F^\theta_{1j+1/2,k} - F^\theta_{1j-1/2,k} + \frac{1}{\Delta y} F^\theta_{2j,k+1/2} - F^\theta_{2j,k-1/2} = 0,$

(*continued*)

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Table 1. Continued

Equation no.	Incorrect equation
3a	$f^{'} = u^2 - \frac{1}{\mathrm{Re}} u^{'} = s, \psi x_{j+1/2,k} \le x \le x_{j+3/2,k}, \psi y = y_j,$
3b	$u(\boldsymbol{x}_{j+1/2,k}) = u_{j+1/2,k}, u(\boldsymbol{x}_{j+3/2,k}) = u_{j+3/2,k},$
4	$s = -p_x - C^u, \psi C^u = uv - \frac{1}{\mathrm{Re}} u_{y_y}.$
6	$\left(\overleftarrow{e}^{\,-\Lambda} u\right) +^{\leftarrow} \mathrm{Re} e^{-\Lambda} f_{j+1} = -\mathrm{Re} e^{-\Lambda} S(x) \cdot \psi$
7	$\Bigg(\left(e^{-\Lambda_{j+3/2k}}\right) u_{j+3/2,k} - \Bigg(\left(e^{-\Lambda_{j+1/2k}}\right) u_{j+1/2,k} + \mathrm{Re}\int_{x_{j+1/2k}}^{x_{j+3/2k}} e^{-\Lambda(x)} \mathrm{d}x \Bigg) f_{j+1} = -\mathrm{Re} \int_{x_{j+1/2k}}^{x_{j+3/2k}} e^{-\Lambda(x)} S(x) \mathrm{d}x$
9	$f_{j+1} = -\frac{1}{\mathrm{Re}} \frac{e^{-\Lambda_{j+3/2k}} u_{j+3/2,k} - e^{-\Lambda_{j+1/2k}} u_{j+1/2,k}}{\langle e^{-\Lambda}, 1\rangle} - \frac{\langle e^{-\Lambda}, S\rangle}{\langle e^{-\Lambda}, 1\rangle}, \psi$
10a	$f_{j+1} = f^{\mathrm{h}}_{j+1} + f^{\mathrm{i}}_{j+1}, \psi$
10b	$f^{\mathrm{h}}_{j+1} = -\frac{1}{\mathrm{Re}} \frac{e^{-\Lambda_{j+3/2k}} u_{j+3/2,k} - e^{-\Lambda_{j+1/2k}} u_{j+1/2,k}}{\langle e^{-\Lambda}, 1\rangle}, \psi$
10c	$f^{\mathrm{i}}_{j+1} = -\frac{\langle e^{-\Lambda}, S\rangle}{\langle e^{-\Lambda}, 1\rangle} \cdot \psi$
11	$\langle e^{-\Lambda}, 1\rangle = \int_{x_{j+1/2k}}^{x_{j+3/2k}} e^{-\Lambda} \mathrm{d}x = \frac{\Delta x}{P^*}\left(e^{\overleftarrow{P}^*/2} - e^{-P^*/2}\right) \leftarrow$
12a	$f^{\mathrm{h}}_{j+1} = -\frac{1}{\mathrm{Re}\Delta x} B\left(\overleftarrow{P}^*\right) u_{j+3/2,k} - B(-P^*) u_{j+1/2,k}, \psi$
12b	$\boldsymbol{B}\left(\overleftarrow{P}^*\right) = \frac{P^*}{e^{P^*} - 1} \cdot \psi$
13a	$f^{\mathrm{i}}_{j+1} = f^{p}_{j+1} + f^{c}_{j+1}, \psi$
13b	$f^{p}_{j+1} = -\frac{\langle e^{-\Lambda}, p - p_{j+1}\rangle}{\langle e^{-\Lambda}, 1\rangle}, \psi f^{c}_{j+1} = -\frac{\langle e^{-\Lambda}, S^u\rangle}{\langle e^{-\Lambda}, 1\rangle} \cdot \psi$
14a	$p(x) - p_{j+1} = \begin{cases} (\delta_x p)_{j+1/2,k}(x - x_{j+1}) \leftarrow & \text{for } x_{j+1/2,k} \le x \le x_{j+1}, \\ (\delta_x p)_{j+3/2,k}(x - x_{j+1}) \leftarrow & \text{for } x_{j+1} < x \le x_{j+3/2,k}, \end{cases}$
14b	$(\delta_x p)_{j+1/2,k} = \frac{p_{j+1,k} - p_{i,j}}{\Delta x}, \psi (\delta_x p)_{j+3/2,k} = \frac{p_{i+2,j} - p_{i+1,j}}{\Delta x} \cdot \psi$
14c	$\langle e^{-\Lambda}, p(x) - p_{j+1}\rangle = -\frac{\Delta x^2}{P^{*2}} \frac{P^{*\leftarrow}}{2} e^{P^{*\leftarrow}/2} + 1 - e^{P^{*\leftarrow}/2} (\delta_x p)_{j+1/2,k}$ $- \frac{\Delta x^2}{P^{*2}} \frac{P^*}{2} e^{-P^{*\leftarrow}/2} - 1 + e^{-P^{*\leftarrow}/2} (\delta_x p)_{j+3/2,k}$
15	$f^{p}_{j+1} = \Delta x C\left(\overleftarrow{P}^*\right) (\delta_x p)_{j+3/2,k} - C(-P^*)(\delta_x p)_{j+1/2,k}$
16	$f^{c}_{j+1} = -\Delta x \frac{1}{2} - W(P^*) \leftarrow C^{u}_{j+1,k},$
17	$f^{'} = v^2 - \frac{1}{\mathrm{Re}} v^{'} = s, \psi y_{k+1/2} \le y \le y_{k+3/2}, \psi x = x_j,$
18a	$f_{j+1} = f^{\mathrm{h}}_{j+1} + f^{\mathrm{i}}_{j+1}, \psi$
18b	$f^{\mathrm{h}}_{j+1} = -\frac{1}{\mathrm{Re}\Delta y} B\left(\overleftarrow{P}^*\right) v_{i,j+3/2} - B(-P^*) v_{j,k+1/2}, \psi P^* \overset{\leftarrow}{=} \mathrm{Re} v^* \Delta y$
18d	$f^{c}_{j+1} = -\Delta y \frac{1}{2} - W(P^*) \leftarrow C^{v},$

(*continued*)

Table 1. Continued

Equation no.	Incorrect equation
18e	$f^{p}_{j+1} = \Delta y C(P^{*})(\delta_y p)_{i,j+3/2} - C(-P^{*})(\delta_y p)_{j,k+1/2}, \psi$
18f	$f^{\theta}_{j+1} = -\Delta y \frac{\mathrm{Gr}}{\mathrm{Re}^2}\frac{1}{2} - W(P^{*}) \leftarrow \widetilde{\theta}_{j,k+1/2} \cdot \psi$
19a	$f' = u\theta - \frac{1}{\mathrm{RePr}}\theta' = C^{\theta,v}, x_j \le x \le x_{j+1}, \psi y = y_k, \psi$
19b	$\theta(\boldsymbol{x}_{j,k}) = \theta_{j,k}, \psi\theta(\boldsymbol{x}_{j+1,k}) = \theta_{j+1,k}, \psi$
19c	$F^{\theta}_{1j+1/2,k} = f_{j+1/2} = -\frac{1}{\mathrm{RePr}\Delta x} B\left(\overleftarrow{P}^{*}\right)\theta_{j+1,k} - B(-P^{*})\theta_{j,k} - \Delta x \frac{1}{2} - W(P^{*}) \leftarrow C^{\theta,v}_{j+1/2,k},$
20a	$f' = v\theta - \frac{1}{\mathrm{RePr}}\theta' = C^{\theta,u}, \psi y_k \le y \le y_{k+1}, \psi x = x_j, \psi$
20b	$\theta(\boldsymbol{x}_{j,k}) = \theta_{j,k}, \psi\theta(\boldsymbol{x}_{j,k+1}) = \theta_{j,k+1}, \psi$
21	$F^{u}_{2j+1/2,k+1/2} = -\frac{1}{\mathrm{Re}\Delta y} BP^{*\leftarrow}_{v} u_{j+1/2,k+1} - B - P^{*\leftarrow}_{v} u_{j+1/2,k}$
22	$F^{v}_{1j+1/2,k+1/2} = f(\boldsymbol{x}_{j+1/2,k+1/2}) \equiv -\frac{1}{\mathrm{Re}\Delta x} BP^{*\leftarrow}_{u} v_{j+1,k+1/2} - B - P^{*\leftarrow}_{u} u_{j,k+1/2}$
23a	$u(x, y, t) = \sin(\pi x)\cos(\pi y) exp - 2\pi 2t/\mathrm{Re}, \psi$
23b	$v(x, y, t) = -\cos(\pi x)\sin(\pi y) exp - 2\pi 2t/\mathrm{Re}, \psi$
23c	$p(x, y, t) = \frac{1}{4}\cos(2\pi x) + \cos(2\pi y)\, exp - 4\pi^2 t/\mathrm{Re}.$

On page 2791, the inline incorrect equation $\boldsymbol{f}^{u} = f^{u}_1\boldsymbol{e}_1 + f^{u}_2\boldsymbol{e}_2, \psi\boldsymbol{f}^{v} = f^{v}_1\boldsymbol{e}_1 + f^{v}_2\boldsymbol{e}_2, \psi\boldsymbol{f}^{\theta} = f^{\theta}_1\boldsymbol{e}_1 + f^{\theta}_2\boldsymbol{e}_2,, f^{u}_1 = u^2 - \mathrm{Pr}\frac{\partial u}{\partial x}), \psi f^{v}_1 = uv - \frac{1}{\mathrm{Re}}\frac{\partial v}{\partial x}), \psi f^{\theta}_1 = \left(u\theta - \frac{1}{\mathrm{RePr}}\frac{\partial\theta}{\partial x}\right)$ has been corrected.

On page 2792, the inline incorrect equation $\Omega^{v}_{j,k+1/2} \cdot \dot{\boldsymbol{u}}_{j+1/2,k}, \psi\dot{v}_{j,k+1/2},, \Omega^{u}_{j+1/2,k}, \psi\Omega^{v}_{j,k+1/2}, F^{u}_{1j+1,k}, F^{v}_{2j,k+1}, \overline{\psi}^{\mathrm{e}}$ has been corrected.

On page 2795, the inline incorrect equation $B(z) - B(-z) = -z, \ \psi$ and $B(z) + B(-z) = z\frac{e^{z}+1}{e^{z}-1}$. has been corrected.

On page 2796, the inline incorrect equation $F^{u}_{1j+1,k} = -\frac{1}{\mathrm{Re}\Delta x} - P^{*}_{u}\overleftarrow{u}_{j+1} + \frac{\Delta x}{2}u'_{j+1} P^{*}_{u}\frac{e^{P'_{u}}+1}{e^{P+}-1} - \frac{\Delta x^2}{8}P^{*}\overleftarrow{u}''_{j+1} + \mathcal{O}(\Delta x)^3, \ F^{u}_{1j+1,k} = u^2_{j+1} - \frac{1}{\mathrm{Re}}u_{j+1} - \frac{1}{\mathrm{Re}}A(P^{*})u'_{j+1} + \mathcal{O}(\Delta x)^2$. has been corrected.

On page 2797, the inline incorrect equation $C\left(\overleftarrow{P}^{*}\right) = \frac{e^{\frac{P^{*\leftarrow}}{2}} - \frac{P^{*\leftarrow}}{2} - 1}{P^{*}\left(\overleftarrow{e}^{P^{*}} - 1\right)} \cdot \psi$ has been corrected.

On page 2798, the inline incorrect equation $\langle e^{-\Lambda}, S^{u}\rangle = -\frac{C^{u}\Delta x^2}{P^{*2}}\frac{P^{*}}{2}\left(\overleftarrow{e}^{\,P^{*\leftarrow}/2} + e^{-P^{*\leftarrow}/2}\right) - \left(\overleftarrow{e}^{\,*\leftarrow/2} - e^{-P^{*\leftarrow}/2}\right), \ W(P^{*}) = \frac{e^{P^{*\leftarrow}} - P^{*} - 1}{P^{*}(e^{P^{*\leftarrow}} - 1)}., \ v(\boldsymbol{x}_{j,k+1/2}) = v_{j,k+1/2}, \psi\boldsymbol{v}(\boldsymbol{x}_{j,k+3/2}) = v_{j,k+3/2}$, has been corrected.

On page 2800, the inline incorrect equation:

$$f^{\mathrm{h}}_{j+1} \approx f^{\mathrm{cd}}_{j+1} = -\frac{1}{\mathrm{Re}\Delta x}(\boldsymbol{u}_{j+3/2k} - u_{j+1/2k}), \psi \text{ if } \ \boldsymbol{P}^{*} \overleftarrow{=} 0, \quad \text{and}$$

$$f^{\mathrm{h}}_{j+1} \approx f^{\mathrm{uw}}_{j+1} = -u^{*\leftarrow}\mathrm{sign}(P^{*}) - 1u_{j+3/2,k} - \mathrm{sign}(P^{*}) + 1u_{j+1/2,k}, \psi \text{ if } \ |P^{*}| \to \infty.\psi$$

$$\text{if } P^* = 0, \psi f^{\mathrm{P}}_{j+1} = \frac{\Delta x}{8}(\delta_x p)_{j+3/2,k} - (\delta_x p)_{j+1/2,k}, \quad \psi \quad \text{and}$$

$$\text{if} \quad |P^*| \to \infty, k f^{\mathrm{P}}_{j+1} = \frac{\Delta x}{4}\ 1 - \mathrm{sign}(P^*)(\delta_x p)_{j+3/2,k} - 1 + \mathrm{sign}(P^*)(\delta_x p)_{j+1/2,k}.$$

$f^{\mathrm{c}}_{j+1} = 0, \psi$ if $P^* \leftarrow 0, \psi$ and $f^{\mathrm{c}}_{j+1} = -\frac{\Delta x}{2}\mathrm{sign}(P^*) C^u_{j+1,k}, \psi$ if $|P^*| \to \infty . \psi$ has been corrected.

In Table 1, the second column head had incorrect equation $P^*_u \leftleftarrows 0$ which has been corrected.

On page 2801, the inline incorrect equation $F2^u_{j+1/2,k-1/2}, \psi,$

$$f^{'} = uv - \frac{1}{\mathrm{Re}} u^{'} \ = 0, \psi y_k \le y \le y_{k+1}, \psi x = x_{j+1/2}, \psi$$
$$u(\boldsymbol{x}_{j+1/2,k}) = u_{j+1/2,k}, \psi \boldsymbol{u}(\boldsymbol{x}_{j+1/2,k+1}) = u_{j+1/2,k+1}, \psi$$

$F1^v_{j+1/2,k+1/2}, \psi$a, $P^*_v \leftleftarrows$,

$$f^{'} = uv - \frac{1}{\mathrm{Re}} v^{'} \ = 0, \psi x_j \le x \le x_{j+1}, \psi y = y_{k+1/2}, \psi$$
$$v(\boldsymbol{x}_{j,k+1/2}) =\leftarrow v_{j,k+1/2}, \psi v(\boldsymbol{x}_{j+1,k+1/2}) =\leftarrow v_{j+1,k+1/2}, \psi$$

has been corrected.

On page 2802, the inline incorrect equation $F^u_{1j+1,k} \approx f_{j+1,k} = f^h_{j+1,k} + f^i_{j+1,k} \cdot \psi$ has been corrected.

In Table 2, the row headings had incorrect equations OoC in $\|\cdot\|_{L_1}, \psi \|\cdot\|_{L_2}$ has been corrected.

This error was introduced during the article publication process, for which the publisher apologises.