

Corrigendum

Corrigendum to “Non-convolutional second-order complex-frequency-shifted perfectly matched layers for transient elastic wave propagation” *Comput. Methods Appl. Mech. Engrg.* 377 (2021) 113704

Stijn François^a, Heedong Goh^b, Loukas F. Kallivokas^{b,c,*}

^a Department of Civil Engineering, KU Leuven, Leuven, Belgium

^b Department of Civil, Architectural and Environmental Engineering, The University of Texas at Austin, Austin, TX, USA

^c Oden Institute for Computational Engineering and Sciences, The University of Texas at Austin, Austin, TX, USA

Available online xxxx

Corrigendum

The authors wish to correct typographical errors in the published version of the article that could affect the implementation of the developed CFS-PML elements. We regret any inconvenience the typographical errors may have caused. We note that the reported numerical results are not affected, because they were produced by the correct equations. In the following, all section and equation references are with respect to the published article.

- In Section 4.2, the last two rows of \mathbf{L}_η in equation (39)b were incorrect; the equation should be replaced with:

$$\mathbf{L}_\xi = \begin{bmatrix} 1 & 0 \\ 0 & 0 \\ 0 & 1 \end{bmatrix} \quad \text{and} \quad \mathbf{L}_\eta = \begin{bmatrix} 0 & 0 \\ 0 & 1 \\ 1 & 0 \end{bmatrix} \quad (39)$$

- In Section 4.3, vector \mathbf{V}^T in equation (50) should not be subscripted, while all vectors \mathbf{V} in (50)-(53) should bear a hat, in accordance with definitions (46)-(49). Thus (50)-(53) should read:

$$S^{\text{PML}} = \hat{\mathbf{V}}^T \left[\int_{\Omega^{\text{PML}}} \left(\frac{\alpha_y}{\alpha_x} \mathbf{B}_x^T \mathbf{C} \mathbf{B}_x + \frac{\alpha_x}{\alpha_y} \mathbf{B}_y^T \mathbf{C} \mathbf{B}_y + \mathbf{B}_x^T \mathbf{C} \mathbf{B}_y + \mathbf{B}_y^T \mathbf{C} \mathbf{B}_x + \rho A_x A_y \mathbf{N}_u^T \mathbf{N}_u \right) dV \right] \hat{\mathbf{U}} \\ + \hat{\mathbf{V}}^T \left[\int_{\Omega^{\text{PML}}} \mathbf{B}_x^T \mathbf{C} \mathbf{B}_\xi dV \right] \hat{\boldsymbol{\xi}} + \hat{\mathbf{V}}^T \left[\int_{\Omega^{\text{PML}}} \mathbf{B}_y^T \mathbf{C} \mathbf{B}_\eta dV \right] \hat{\mathbf{H}} + \hat{\mathbf{V}}^T \left[\int_{\Omega^{\text{PML}}} \rho A_x A_y \mathbf{N}_u^T \mathbf{N}_u dV \right] \hat{\boldsymbol{\xi}}. \quad (40)$$

$$\hat{\mathbf{V}}_\xi^T \left[\int_{\Omega^{\text{PML}}} A_x B_y \mathbf{N}_\xi^T \mathbf{N}_\xi dV \right] \hat{\boldsymbol{\xi}} - \hat{\mathbf{V}}_\xi^T \left[\int_{\Omega^{\text{PML}}} \left(A_y B_x - \frac{\alpha_y}{\alpha_x} A_x B_y \right) \mathbf{N}_\xi^T \mathbf{L}_\xi^T \mathbf{B}_x dV \right] \hat{\mathbf{U}} = 0. \quad (41)$$

DOI of original article: <https://doi.org/10.1016/j.cma.2021.113704>.

* Corresponding author at: Department of Civil, Architectural and Environmental Engineering, The University of Texas at Austin, Austin, TX, USA.

E-mail addresses: stijn.francois@kuleuven.be (S. François), heedong.goh@utexas.edu (H. Goh), loukas@mail.utexas.edu (L.F. Kallivokas).

<https://doi.org/10.1016/j.cma.2022.115578>

0045-7825/© 2021 Elsevier B.V. All rights reserved.

$$\hat{\mathbf{V}}_{\eta}^T \left[\int_{\Omega^{\text{PML}}} A_y B_x \mathbf{N}_{\eta}^T \mathbf{N}_{\eta} dV \right] \hat{\mathbf{H}} - \hat{\mathbf{V}}_{\eta}^T \left[\int_{\Omega^{\text{PML}}} \left(A_x B_y - \frac{\alpha_x}{\alpha_y} A_x B_y \right) \mathbf{N}_{\eta}^T \mathbf{L}_{\eta}^T \mathbf{B}_y dV \right] \hat{\mathbf{U}} = 0. \quad (42)$$

$$\hat{\mathbf{V}}_{\mathbf{u}}^T \left[\int_{\Omega^{\text{PML}}} B_x B_y \mathbf{N}_{\mathbf{u}}^T \mathbf{N}_{\mathbf{u}} dV \right] \hat{\mathbf{U}} - \hat{\mathbf{V}}_{\mathbf{u}}^T \left[\int_{\Omega^{\text{PML}}} ((i\omega)^2 - B_x B_y) \mathbf{N}_{\mathbf{u}}^T \mathbf{N}_{\mathbf{u}} dV \right] \hat{\mathbf{U}} = 0. \quad (43)$$

- In Section 4.3, equation (59) was correct in the published article, but could also be simplified to read:

$$\mathbf{M}_{\text{PML}} = \int_{\Omega^{\text{PML}}} \begin{bmatrix} \rho a_2 \mathbf{N}_{\mathbf{u}}^T \mathbf{N}_{\mathbf{u}} & \mathbf{0} & \mathbf{0} & \rho a_2 \mathbf{N}_{\mathbf{u}}^T \mathbf{N}_{\mathbf{u}} \\ \mathbf{0} & \gamma_2 \mathbf{N}_{\xi}^T \mathbf{N}_{\xi} & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \delta_2 \mathbf{N}_{\eta}^T \mathbf{N}_{\eta} & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & b_2 \mathbf{N}_{\mathbf{u}}^T \mathbf{N}_{\mathbf{u}} \end{bmatrix} dV. \quad (59)$$

- In Section 5.1, the denominator in the first bracket of the Ricker pulse definition had an extra term; equation (66) should instead read:

$$\mathbf{p}(x, y, t) = \left(0, -\delta(x-0, y-0) \left[1 - 2 \left(\frac{\pi(t-t_s)}{t_d} \right)^2 \right] \exp \left[- \left(\frac{\pi(t-t_s)}{t_d} \right)^2 \right] \right). \quad (66)$$

- The snapshots shown in subfigures (a), (b), and (c) of Figure 6 were taken at $t = 1$ s, $t = 2$ s, and $t = 3$ s, respectively.
- In Figure 7d, the figure inset should read R2y, instead of R2z.
- In Figure 8d, the figure inset should read R2y, instead of R1y.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors wish to thank colleagues who used the new elements and brought to our attention the typographical error of Eq. (39); in particular, we wish to thank Mr. Mingwei Cai, currently a graduate student at the University of Texas at Austin, whose careful parsing of the published article led to this corrigendum.