Erratum to: Time-dependent wave packet propagation using quantum hydrodynamics

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In the original publication, an error occurred in Eqs. (27) and (28) involving the mixed derivative terms (the third term on the right-hand-side (RHS) of Eq. 27 and the second term on the RHS of Eq. 28). This error also affected Eqs. 30, 31, 42, 43, 44, 61, 63, and 65. The corrected versions of these equations are given below. Since the mixed derivative terms are negligible for the example two-dimensional application, none of the results or conclusions were affected by this error.

The corrected versions of Eqs. (27) and (28) are

$$m \partial_t v = -\partial_x (V + Q) - m v \partial_x v - m u \partial_x u, \quad (27)$$

$$m \partial_t u = -\partial_y (V + Q) - m v \partial_y v - m u \partial_y u. \quad (28)$$

The error in the finite difference equation for v involves the last term in brackets on the RHS of Eq. (30). The corrected version of this equation is

$$\begin{aligned} m(v_{i,j}^{n+1} - v_{i,j}^n)/\Delta t = & (f_{i,j}^{n+1} + f_{i,j}^n)/2 - m[v_{i,j}^{n+1}(v_{i+1,j}^{n+1} - v_{i-1,j}^{n+1}) \\ & + v_{i,j}^n(v_{i+1,j}^n - v_{i-1,j}^n)]/(4\Delta x) \\ & - m[u_{i,j}^{n+1}(u_{i+1,j}^{n+1} - u_{i-1,j}^{n+1}) \\ & + u_{i,j}^n(u_{i+1,j}^n - u_{i-1,j}^n)]/(4\Delta x). \end{aligned} \quad (30)$$

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The error in the finite difference equation for u involves the first term in brackets on the RHS of Eq. (31). The corrected version of this equation is

$$\begin{aligned} m(u_{i,j}^{n+1} - u_{i,j}^n)/\Delta t = & (g_{i,j}^{n+1} + g_{i,j}^n)/2 - m[v_{i,j}^{n+1}(v_{i,j+1}^{n+1} - v_{i,j-1}^{n+1}) \\ & + v_{i,j}^n(v_{i,j+1}^n - v_{i,j-1}^n)]/(4\Delta y) \\ & - m[u_{i,j}^{n+1}(u_{i,j+1}^{n+1} - u_{i,j-1}^{n+1}) \\ & + u_{i,j}^n(u_{i,j+1}^n - u_{i,j-1}^n)]/(4\Delta y). \end{aligned} \quad (31)$$

The error in the truncation error equations for v involves the third terms on the RHS of Eqs. (42), (43), (44), and (61). The corrected versions of these equations are obtained by replacing the $u_{i,j}^{n'} \partial_y v_{i,j}^{n'}$ with $u_{i,j}^{n'} \partial_x u_{i,j}^{n'}$. The artificial viscosity functions $^1\gamma_i$ in Eq. (63) are unchanged for $i = 1-7, 11, 13, 18$, and 21 . The others have the same functional form, but a different constant multiplier. The corrected multipliers for the $^1\gamma_i$ with $i = 8, 9, 10, 12, 14, 15, 16, 17, 19, 20$, and 22 are $-3, 6, 6, 9, 15, 7, 3, 5, 2.5, 3.0$, and 3.5 , respectively. One new function should be included: $^1\gamma_{23} = -3mvu\partial_x u$. The $^2\gamma_i$ in Eq. (65) are unchanged for $i = 6$ and 10 . Most of the others have the same functional form, but a different constant multiplier. The corrected multipliers for the $^2\gamma_i$ with $i = 2, 4, 5, 7, 8$, and $11-19$ are $-1, 4, 6, 1.5, -2, 2, 6, 4, 8, 3, 2, 1, 7, 0.5$, respectively. The three $^2\gamma_i$ functions for $i = 1, 3$, and 9 are replaced with six new functions given by $^2\gamma_1 = 2h(\partial_y C)^2 \partial_x v$, $^2\gamma_3 = 2h\partial_y^2 C \partial_x v$, $^2\gamma_9 = 4hv\partial_y C \partial_{xy}^2 C$, $^2\gamma_{20} = 6h\partial_y C \partial_{xy}^2 v$, $^2\gamma_{21} = 2hv\partial_{xy}^3 C$, and $^2\gamma_{22} = 3h\partial_{xy}^3 v$.