Errata for: "An Element-Free Galerkin (EFG) Meshfree Method Model for Carbon Sequestration"
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Errata for: "An Element-Free Galerkin (EFG) Meshfree Method Model for Carbon Sequestration"

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Abstract **-** The element-free Galerkin (EFG) meshfree method is presented to study the vertically averaged two-phase flow of carbon dioxide (CO_2) and brine during the injection and sequestration of CO_2 in the deep saline aquifer. A local nodal refinement is introduced around the injection well to capture the near-injection well asymptotic pressure solution with lesser nodal density in the domain. The stabilisation parameter study and nodal independence analysis have been performed in the EFG method to fix the stabilisation parameter (τ) and the maximum Courant number (Cr_{max}) respectively, to accurately estimate the pressure and average CO_2 saturation solution without spurious oscillations. The methodology comprises solving two simultaneous partial differential equations (PDE) involving pressure and saturation terms which are obtained by combining mass conservation (continuity equation) and momentum conservation (Darcy's law of multiphase extension) equations. These equations are sequentially solved using the IMplicit Pressure and Explicit Saturation (IMPES) solution strategy to obtain the spatial and temporal distribution of aquifer bottom pressure build-up and the average CO_2 saturation and these obtained results will help to study the integrity of seal/caprock and the storage capacity of the aquifer respectively. The computed pressure and average CO_2 saturation profiles are compared and validated with existing approximate mesh-based Finite Element Method (FEM) and XFEM (extended FEM) numerical solutions and analytical solutions, and are found to be in good agreement, thus demonstrating the efficiency of the EFG meshfree methodology.

Keywords**:** Carbon Sequestration, Element-Free Galerkin (EFG) Meshfree Method, Vertically Averaged Multiphase Flow Model.

We have a few instances in our original paper [1]; which require further clarification. In page 3, $\underset{u_1}{r}$ and $\underset{u_2}{r}$ are supposed to be written in the vector notations of $\vec{u}_1(x,y,t)$ and $\vec{u}_2(x,y,t)$ which are the vertically averaged brine flux and CO_2 flux respectively, using the multiphase extension of Darcy's law. The terms in the equation (1) and (2) should be understood interms of vector notations and replaced accordingly.

References

[1] P. Dinesh, P. G. Ranjith, M. R. Behera, N. Muthu, "An Element-Free Galerkin (EFG) Meshfree Method Model for Carbon Sequestration". full paper presented in Proceedings of the 3rd World Congress on Momentum, Heat and Mass Transfer (MHMT'18) Budapest, Hungary, 2017.