| No. | Model |
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| [[1]](#footnote-1) | **Geometry:**      **Assumptions:**  Transient state, Air and melted PCM behave as a Newtonian fluid, Laminar flow regime, Impermeable and no-slip condition at walls, The Boussinesq approximation is valid for air, Thermal radiation is negligible, Two-dimensional behavior, PCM is homogeneous and isotropic, The density, thermal conductivity, and specific heat of PCM changes  with change in phase.  **Equations:**  Continuity for air and PCM    Momentum for air    Momentum for PCM    Energy for air and PCM    enthalpy is computed as the sum of sensible heat, *h*, and latent heat Δ*h*,            In summary, the temperature is solved iterating between energy and the liquid fraction equation. In this method, the phase change is not tracked explicitly; otherwise, a porosity formulation is used, which treats the material as a porous medium. Porosity in each element is equal to the liquid fraction. The mushy zone (partial solidified region) is where the liquid fraction has a value between 0 and 1. When the material is fully solidified the liquid fraction becomes 0, which extinguishes the velocity in these regions. To make that possible, a sink term is added in momentum equation.    PCM thermic and hydraulic behavior is significantly influenced by the mushy zone parameter, it measures the amplitude of the damping; the higher this value, the steeper the transition of the velocity of the material to zero as it solidifies. Huge values of *A*mush may cause the predicted solution to oscillate. In the present study, *A*mush had a value of 102.  **Material properties:**    Density, thermal conductivity, and specific heat are temperature-dependent properties.    The volume expansion of the PCM is calculated based on the mass conservation. If the top surface area is constant, then        From the numerical point of view, to solve the expansion of the PCM, it is necessary to use a moving mesh along the Y-axis, but this would entail a great computational cost. Therefore, it was considered that the material had an effective density given by the following equation:    **Numerical method:**  To solve the governing equations and obtain numerical results, commercial package ANSYS FLUENT v15 was used which is based on the finite volume method to solve the equations. The PISO algorithm was used to couple momentum and continuity equations. The convective terms were discretized applying the MUSCL scheme.  For time discretization a second-order implicit scheme was used. |
| [[2]](#footnote-2) | **Geometry:**    **Assumptions:**  The gravity acts in the negative y direction. Boussinesq approximation was used to model the density variation in the buoyancy term. The effects of radiation and viscous dissipation are assumed to be negligible. The fluid (melt PCM) is Newtonian and two dimensional flow assumption is used.  **Equations:**        The value of C=105 depends on the morphology of medium and ε= 0.001 is a small value to prevent division by zero. When PCM is completely liquid (temperature is higher than Tm + ΔT), B1 is 1 and Fa becomes zero. When the transition occurs, momentum equations show very similar behavior with that of Darcy law for fluid flow in porous medium. When the value of B(T) becomes zero, the PCM completely turns to the solid phase.      **Material properties:**        where λ is the PCM heat of fusion and *D* is the delta dirac function which has the following form |

1. Moreno, S., et al. (2020). "Numerical and experimental study of heat transfer in a cubic cavity with a PCM in a vertical heated wall." Applied Thermal Engineering 178: 115647. [↑](#footnote-ref-1)
2. Selimefendigil, F. and H. F. Öztop (2020). "Mixed convection in a PCM filled cavity under the influence of a rotating cylinder." Solar Energy 200: 61-75. [↑](#footnote-ref-2)