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## A domain decomposition method to couple nonisothermal compositional gas liquid Darcy and free gas flows

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A domain decomposition algorithm is introduced to couple non isothermal compositional gas liquid Darcy and free gas flow and transport. At each time step, our algorithm solves iteratively the nonlinear system coupling the nonisothermal compositional Darcy flow in the porous medium, the RANS gas flow in the free-flow domain, and the transport of the species and of energy in the free-flow domain. In order to speed up the convergence of the algorithm, the transmission conditions at the interface are replaced by Robin type boundary conditions. The Robin coefficients are obtained from a diagonal approximation of the Dirichlet to Neumann operator related to a simplified model in the neighbouring subdomain. The efficiency of our domain decomposition algorithm is assessed on several test cases focusing on the modeling of the mass and energy exchanges at the interface between the geological formation and the ventilation galleries of geological radioactive waste disposal.

### References

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