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Fast assessment of CO2 plume extent using a connectivity-based surrogate model

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In a geological carbon storage (GCS) project, it is critical to predict the extent of injected CO2. However, it is not practical to quantify the uncertainty in the CO2 plume extent by conducting full physics flow simulations for hundreds of geological models representing high geological uncertainty. In this study, a computationally efficient surrogate model is introduced to quickly approximate CO2 plume migrations in a 3-dimensional heterogeneous reservoir during an injection period. CO2 plume migrations are approximated based on connectivities between a CO2 injector and other locations, which are computed using rock and fluid properties. The connectivity-based surrogate model saves about 90% of the computational cost in quantifying the uncertainty in the extent of CO2 plume compared to a full physics flow simulator.

References

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