

Highlights

- Improved Quasi-Static Method (IQS) shows proper error convergence through fourth-order discretization, but performance diminishes compared to standard discretization.
- IQS uniqueness criteria can only be preserved through a highly-accurate analytical treatment of delayed neutron precursors.
- The effectiveness of IQS is maximized with time adaptation of shape updates.
- Quasi-static treatment of other kinetic variables, such as temperature, significantly improves IQS performance for multi-physics problems.