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A composite quadrature element with unequal order integration for consolidation problems

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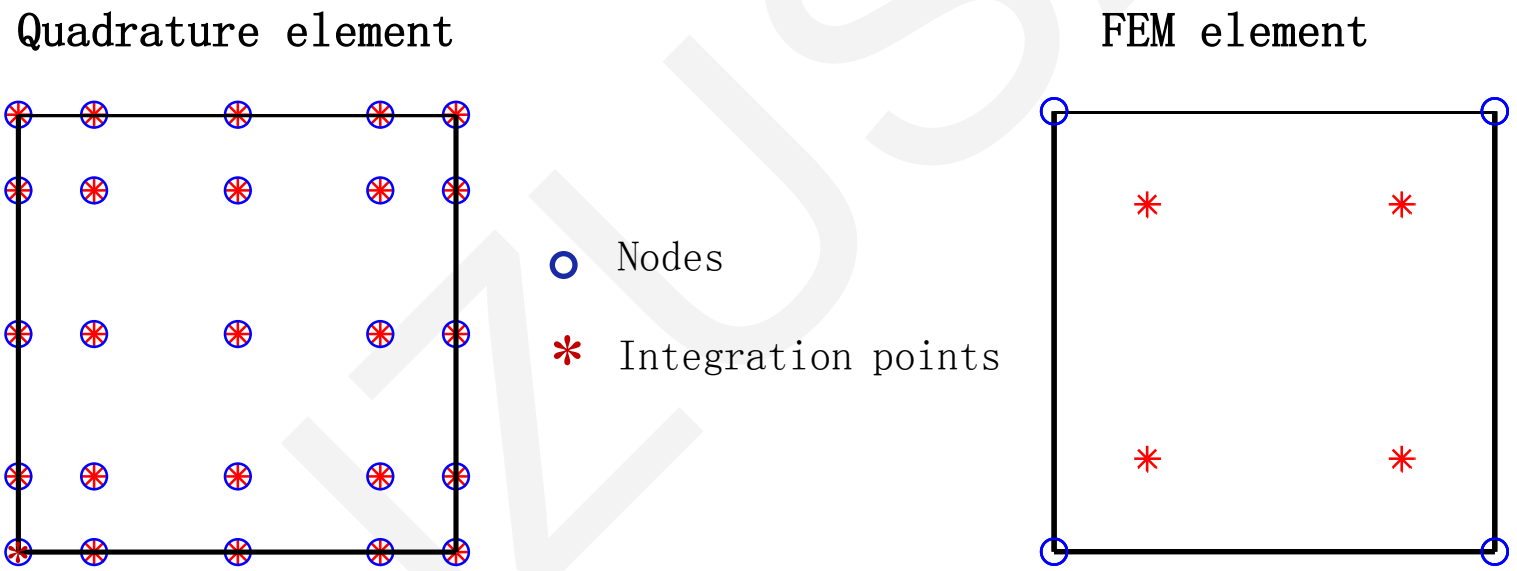
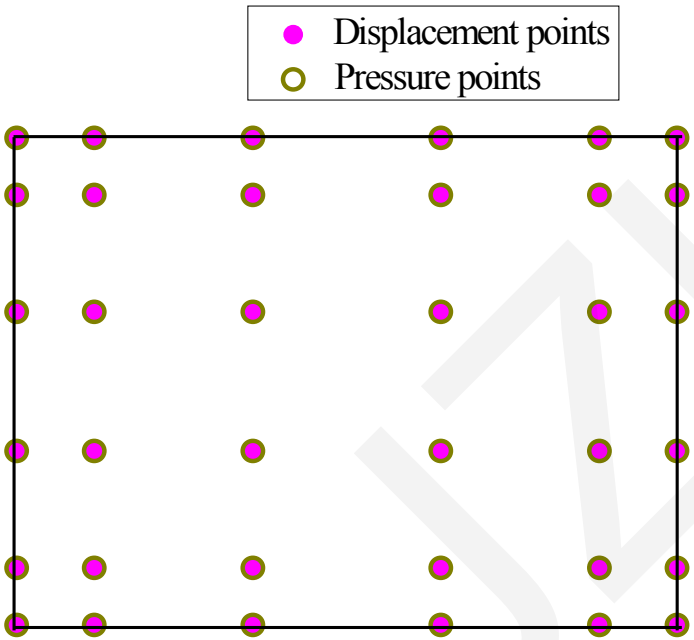
Quadrature element and FEM element

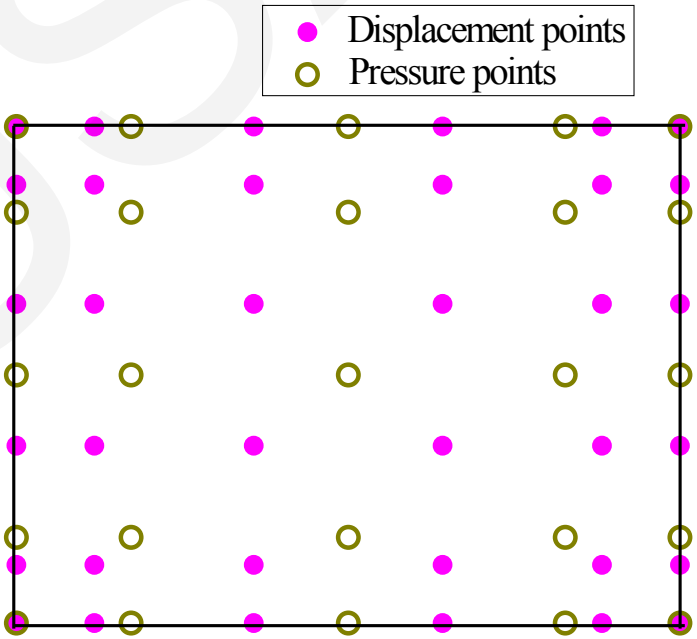


Standard and composite quadrature element

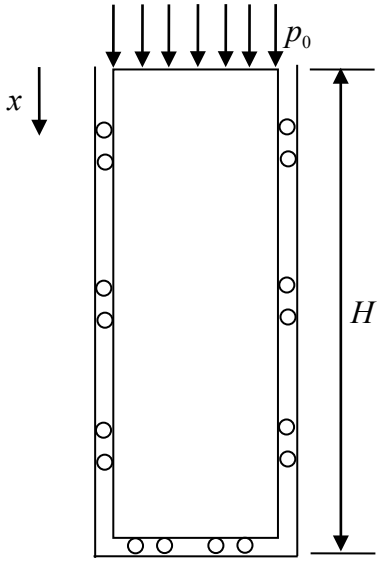
Standard element



Composite element

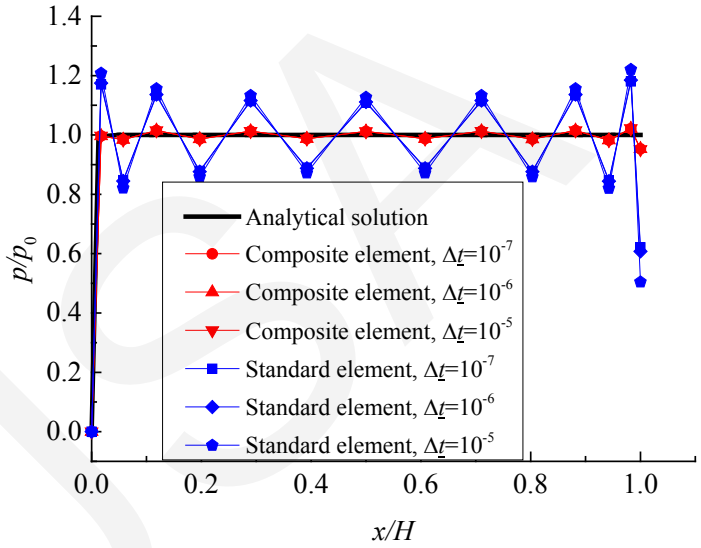


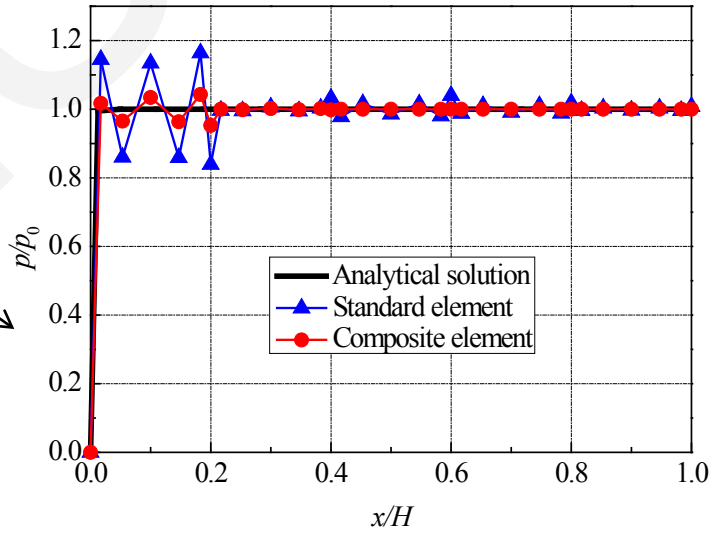
One-dimensional consolidation



One element

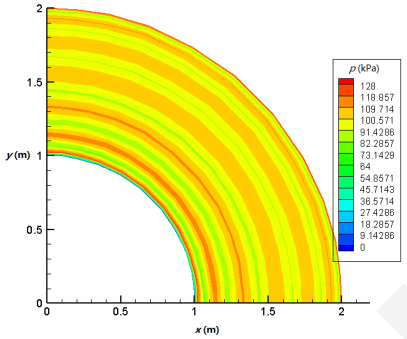
Five elements

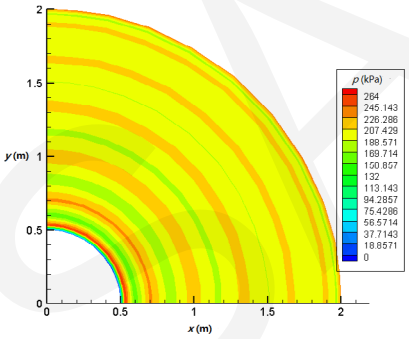


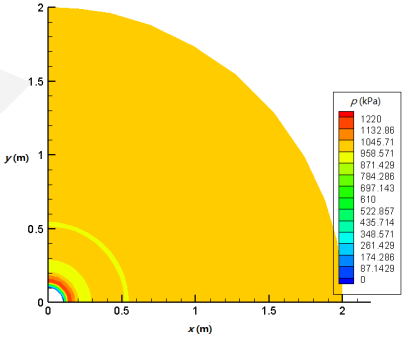


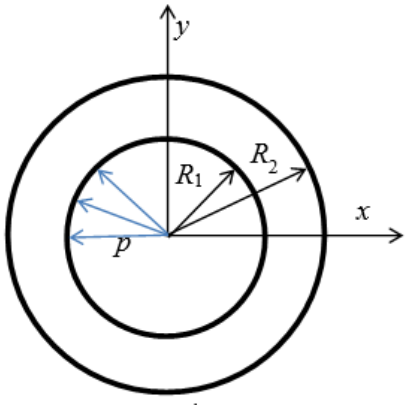
Two-dimensional consolidation

Standard element

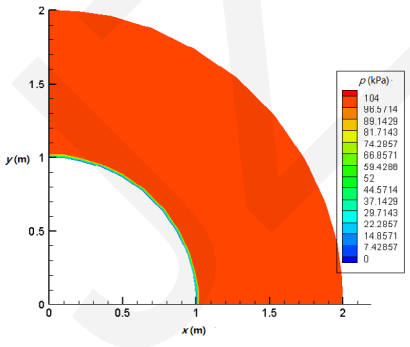


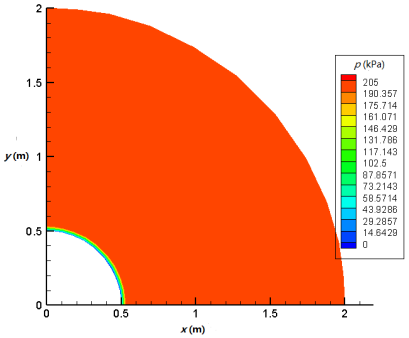


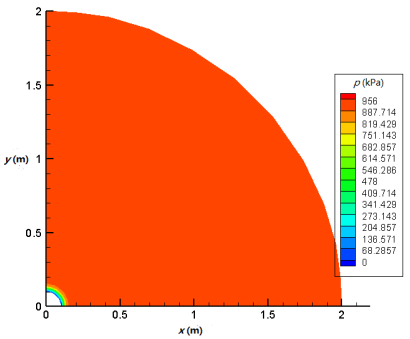




Composite element







Conclusions

- A composite quadrature element is proposed for consolidation analysis to overcome the oscillations produced when small time increments are chosen.

- Different nodes are employed for the displacement and the pore pressure, except those on the corner of the element.

- Oscillations generated when small time steps are used and those induced by the Crank-Nicolson scheme are greatly reduced by the proposed element, and accuracy is also greatly improved.