A NEW DYNAMIC METHOD FOR THE IMPLEMENTATION OF FAULTS IN FINITE-ELEMENT MODELS

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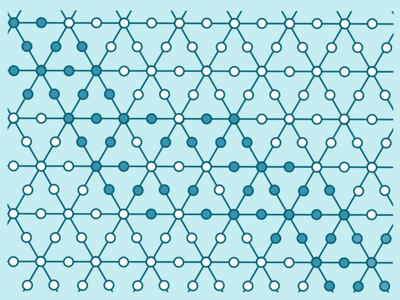
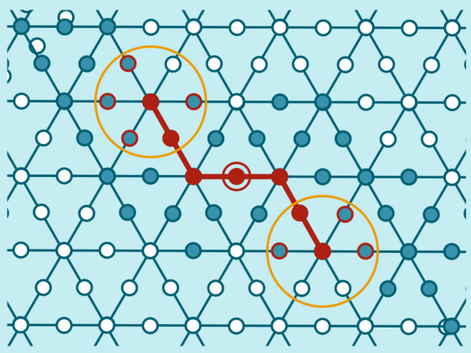
METHOD

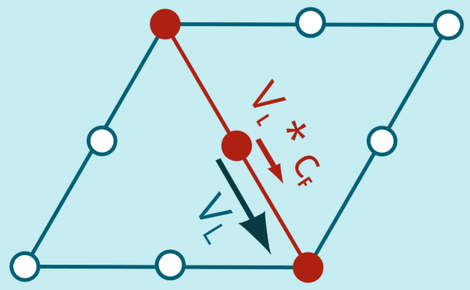
How to represent faults in FE models?



Potential slip nodes where rutpure conditions are satisfied

Nucleation and propagation in two directions, along a line that connects neighboring and protential nodes

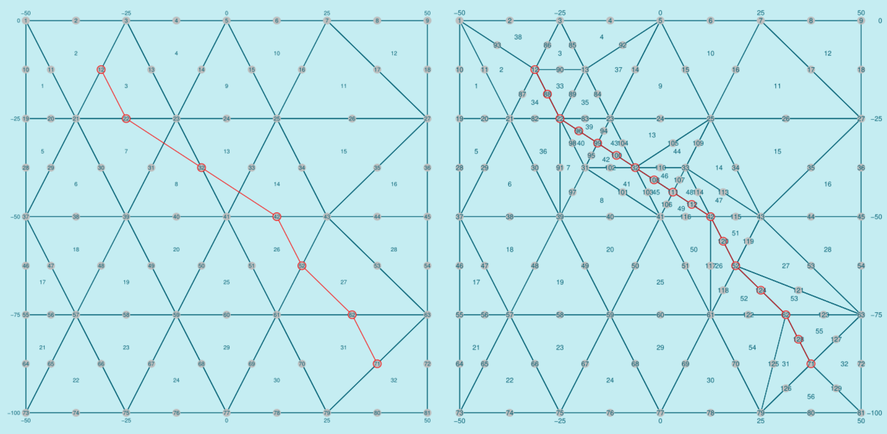




Coupling factor applied to compute velocities on one side having velocities on the other side

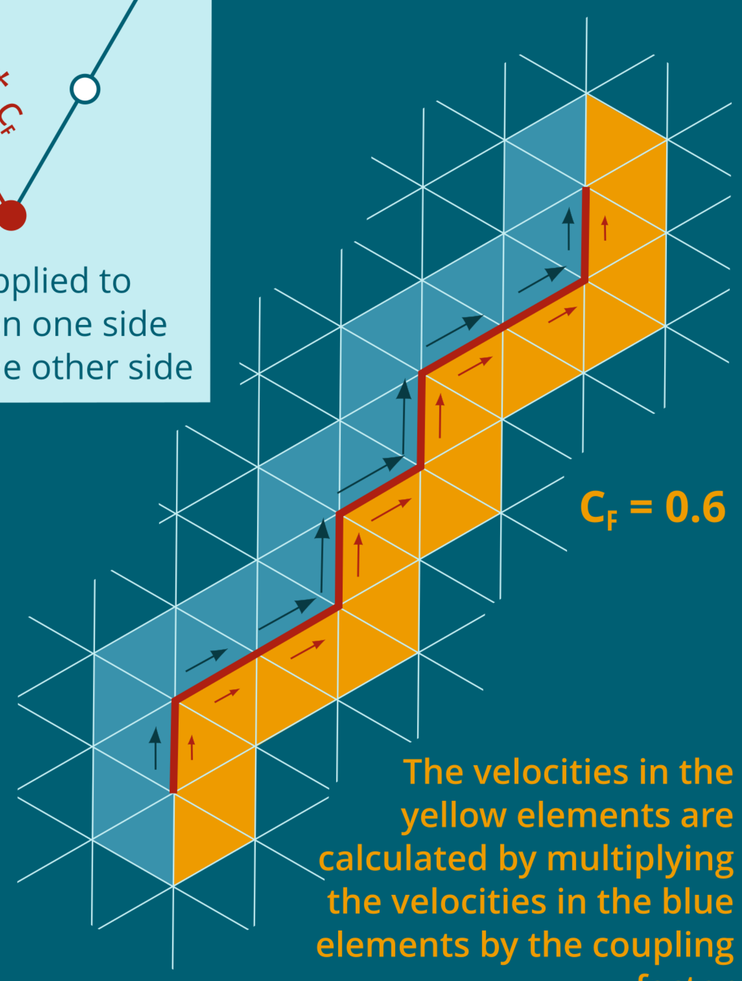
AMR

If the fault cuts the elements



When the fault cuts the grid, a **mesh refinement** is necessary.

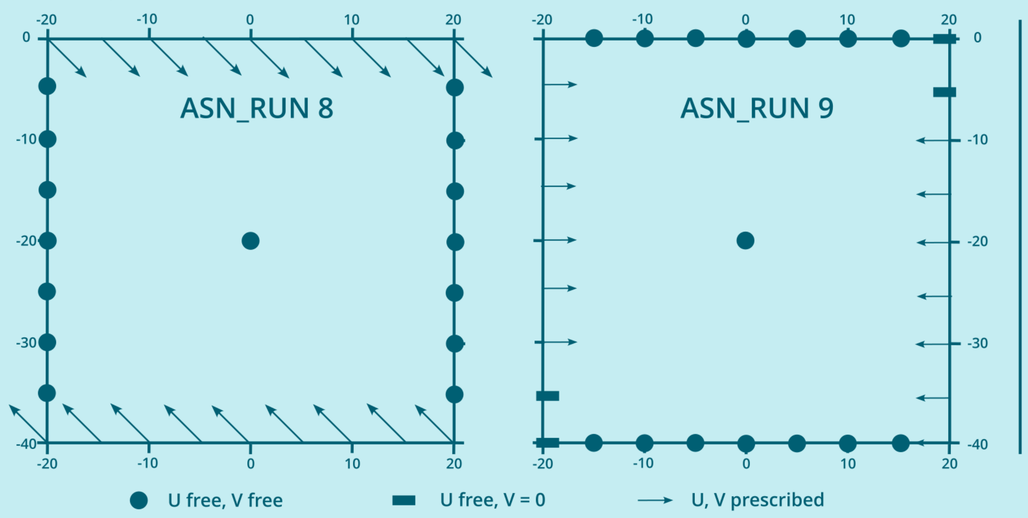
Left: a discontinuity made of many segments, each of which cuts one or more elements.
Right: refined mesh.

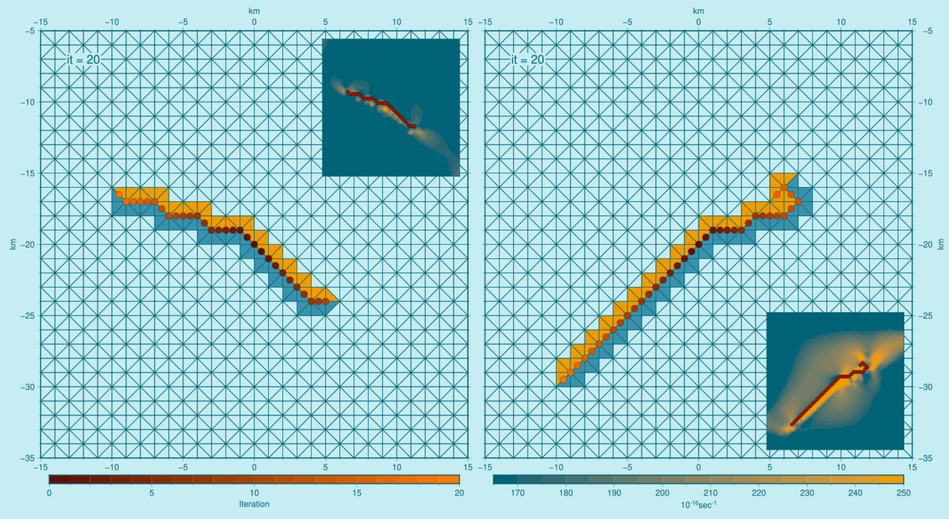


The velocities in the yellow elements are calculated by multiplying the velocities in the blue elements by the coupling factor

PROPAGATION

Test with a small time step



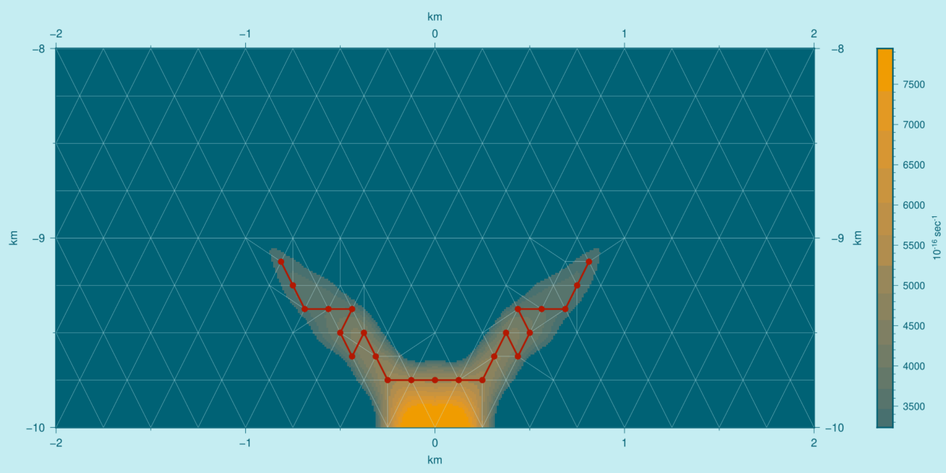


Boundary conditions (left) and results (right). In each time iteration two slip nodes are introduced. "Lefl" and "right" elements are respectively blue and yellow. Slip nodes are coloured in order of appearance. In the subpanel, the background is coloured when the rupture conditions are satisfied.

MOVIES

BRICK

Test with a large time step



We place a **brick** with different viscosity at the bottom of a visco-plastic system and push the sides. The system immediatley breaks generating two **shear bands**.
The algorithm generates a linear fault that approximates the geometry of the shear bands and refines the grid.

CONTACT ME

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