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Full-Stokes modelling of the ice-sheet/ice-shelf transition: a contact problem

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Grounding line migration plays an important role in the stability of marine ice-sheets such as the West Antarctica ice sheet. For modelling purpose, it is generally admitted that the grounding line position, as well as its stability, is determined by the floating condition constrained by the sea water level. With such approach, the vertical position of the sea-ice interface depends only on the ice thickness at this place, so that the non hydrostatic part of the stress within the ice does not play any role. Here, the sea-ice interface is treated as a free surface submitted to the buoyancy sea pressure and the starting point of this surface (i.e. the grounding line) is determined by solving a contact problem. The full-Stokes equations, the air-ice free surface as well as the sea-ice free surface equations are solved in a coupled way with the finite-element code Elmer. In this presentation, using the MISMIP benchmark, we will emphasize the impact of the grid size on the resolution of the contact problem.