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Modelling of the grounding line migration using a buoyancy stress condition

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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. In this presentation, the floating condition is compared with the solution for which the sea water action is modelled by a buoyancy pressure. In the proposed method, the sea-ice interface is treated as a free surface submitted to the buoyancy sea pressure. 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. The difference between the two methods, in term of grounding line stability, is inferred using the Vieli and Payne (2005) tests.