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DEM simulation of oblique boudinage

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Boudinage occurs in mechanically layered rocks if there is a component of lengthening parallel to a brittle layer in a ductile matrix. Asymmetric boudin structures develop if the extension is not layer-parallel, and the boudin blocks rotate. The amount of block rotation is commonly used as shear indicators; therefore, it has been well studied. However, full oblique boudinage has not been modeled yet.
We simulated full boudinage processes during layer oblique extension using DEM simulation software. In our boudinage model, the initial setup consists of three layers: there is a brittle center oblique layer in a ductile matrix. We simulated horizontal extension by applying vertical displacement: the top and bottom boundaries of the model are moved at a constant velocity, while the side boundaries were force controlled by applying a constant confining force.
By varying the cohesion of the competent layer, various type and shape of boudin blocks were developed. By varying the angle of the competent layer, the rotation of the boudin blocks changed. With higher dip of the competent layer, the rotation of the boudin blocks is more consistent.
We also studied the stress field during the simulation. The results show, that in case of ductile material, the disruptions of the layer are driven by the angle of the layer and not the orientation of the external stress field.