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Numerical assessment of the excavated disturbed zone around underground openings designed for radioactive wastes repositories

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This paper presents an analysis of delayed behaviour around underground cavities by determining time-dependent changes in the damaged zone. The behaviour of the material is modelled by the Lemaitre's viscoplastic model including damage law. First, the model enabling coupling between the viscous effects and the delayed damage is presented. Then numerical simulations of underground openings, performed with a finite element code (CAST3M), is discussed. The evolution with respect to time of the extension of the Excavated Damage Zone (EDZ) around an existing tunnel is presented. Finally, a more advanced version of this model is used for typical circular galleries designed for radioactive waste disposal.