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# Decohesion via a second gradient study of indentation in brittle material: Poisson's coefficient and cone crack

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## Résumé

We investigate the load-indentation test on a brittle material when cone crack occurs. For this occurrence of defect, in an original way :

- we use the second gradient model of Rakotomanana-Ravelonarivo [1] in the frame of weak continuous media theory,
- we simply start with the static stress field of Boussinesq (a single force punctually applied normal to the brittle surface [2]),
- then we extend it with introduction of the vector of Cartan devoted to approximate the discontinuity due to the nucleation of rupture.
- the norm of the latter vector is a small perturbation parameter in the equations of equilibrium and the solution at the first order leads to a pragmatic semi-analytical study.

With simplifying assumptions, proper definition of the occurrence of decohesion [3][4] and use of hypergeometric functions, we focus our attention to trap the apex angle of the cone: the influence of Poisson's coefficient has a similar tendency as other previous data (spherical indentation [5] or punching test [6]).

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**Mots-Clés:** Boussinesq, stress, Decohesion, Crack, Indentation, Elastic, Brittle, Cartan, Vector, Perturbation, Method, Hypergeometric, function

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