Equation of State of a Solid: Potts-Percolation Model MIRON
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France — We include stress and strain in a Potts-percolation model of a solid, see
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Neighboring atoms are connected by a bond of Lennard-Jones energy. If the energy
is larger than a threshold the bond is more likely to fail, while if the energy is lower
than the threshold the bond is more likely to be alive. We compute the equation of
state: stress as function of strain and temperature by using renormalization group
and Monte Carlo simulations. The phase diagram and the equation of state are
determined. When the Potts heat capacity is divergent the continuous transition is
replaced by a weak first-order transition through the van der Waals loop mechanism.
When the Potts transition is first order the stress exhibits a large discontinuity as
function of the strain.

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