
Elastic properties of Kaolin group minerals at high pressures

Brahim Benazzouz*¹

¹Ecole Nationale Polytechnique, Department of Civil Engineering, LMGCE, 10 Rue des Frères OUDEK, 16200 El-Harrach, Algiers – Algeria

Abstract

Kaolin group minerals are one of the clay minerals found in the earth's crust. Kaolin group consists of the minerals polymorphs: kaolinite, dickite and nacrite. The unit cell of kaolin group has the similar chemical composition, $\text{Si}_4\text{Al}_4\text{O}_{10}(\text{OH})_8$. In this study, the molecular dynamics simulations based on energy minimization technique have been used, in order to better understand the elastic properties of clay layers that are only a few kilometres deep in the crust, and identify the nature of the phase transition at high pressures. In the first part of this study, the elastic properties of kaolin minerals, including elastic constants, bulk modulus, shear modulus, the S- and P-wave velocities, have been presented. The elastic properties computed appear overall in good agreement with available experimental and previous theoretical results. These three minerals (dickite, nacrite and kaolinite) with different may show varying elastic properties, although are sharing the same chemical formula. The high pressure effects on the elastic properties of Kaolin group have been evaluated and compared. In addition, their phase transition have been found by an abrupt change in the curve of the structural and elastic properties.

*Speaker