

**Finite Element Method on macroscopic elasticity of material composing ellipsoidal pores:
It's application to the crack effect.**

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In the present study, the two-dimensional buffered layer FEM model was developed to investigate the porosity effect on macroscopic elasticity without introducing any assumptions or approximation. The porosity effect was analyzed systematically while considering anisotropy by changing the degree of porosity, asperity of the pore, and elasticity of the matrix. Consequently, various systematic relations were found for two-dimensional porosity effects. The relations are helpful in characterizing two-dimensional cracks in a laboratory rock compression test. The two-dimensional relations were further extended to three-dimensional relations to compare the present results with various real systems, such as meteorites and asteroids, and the results from previous models.