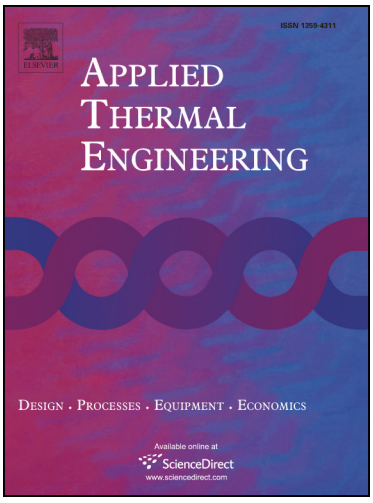

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An investigation of thermal effects on micro-properties of granite by X-ray CT technique

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ABSTRACT

The thermal effects on micro-properties of granite were experimentally studied. The volumetric porosity was observed by the X-ray Computed Tomography (CT) technique and three-dimensional (3D) image reconstruction. Two indexes (heterogeneity coefficient and anisotropy coefficient) were proposed to describe the micro-properties of granite. The thermal effects on these two indexes were discussed. The results shows that micro-porosity increases as temperature increases between 400 ℃ to 800 ℃. It is slightly influenced by temperature beyond this range. Both of the heterogeneity and anisotropy of thermal treated granite increase to their maximums as temperature increases to 500 ℃, than decrease to constants as temperature further increases. The heterogeneity and anisotropy of granite are mainly dominated by the initial cracks below 200 ℃. The thermal induced cracks are mainly in the regions of lower density mineral grains below 400 ℃. Boundary cracks and trans-granular cracks generate significantly above 500 ℃.

Keywords: Thermal effect; X-ray Computed Tomography (CT) technique; Porosity; Heterogeneity; Anisotropy.