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Effect of mineral on mechanical behavior of granite after high-temperature treatment by particle flow simulation

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Understanding the effect of minerals on the mechanical behavior of granite under thermo-mechanical coupling is of great significance in deep engineering. In this paper, nine thermo-mechanical grain-based models of granite with different mineral contents were established based on particle flow simulation, revealing the influence mechanisms of temperature and mineral on the mechanical properties and micro-damage of granite. The results indicate that the macroscopic mechanical properties, micro-damage and failure mode of granite are synergistically affected by mineral, distribution and thermal properties. With increasing temperature, the thermally-induced cracks in the granite samples gradually gather from the edge towards the centre. The proportion of intergranular cracks in thermally-induced cracks is much greater than that of intragranular cracks. The stress concentration between mineral particles caused by the temperature increase is the main cause of thermally-induced cracks.

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