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An Extended Finite Element Method Based Modeling of Hydraulic Fracturing

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Abstract

In hydraulic fracturing, high pressure fluid is injected to the reservoir to create a connected network of fractures. Modeling of the hydraulic fracturing process demands applying a rigorous approach to take into account various mechanisms such as fluid flow inside the fracture, leak-off, rock deformation, and fracture initiation and propagation. Many studies are conducted to analyze each mechanism. These studies have offered different models for each process. However, these models generally failed to capture the essence of each mechanism since they did not examine the process as a whole. Most models are based on analyzing of a 2 dimensional system in which can be misleading in many circumstances.