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Enhancing Realism in Hydraulic Fracturing Simulation Models: the Evolution of KGD and PKN Models

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Abstract Since 1947, the oil and gas industry has been harnessed hydraulic fracturing as a potent tool to amplify hydrocarbon production. Notable among the simulation models emulating this technique are the Khristianovic-Geertsma de Klerk (KGD), Perkins and Kern (PKN) Model, and Pseudo 3-D models (P3D). However, the fracture shape depicted by the KGD model resembles an ellipse, yet fractures do not manifest precisely in this manner. The current study has developed the KGD and PKN models to give an accurate fracture propagation. A good agreement has been reached when comparing the current work with the results of Arash Nasirisavadkouhi. Moreover, the improvement reached shows a reflection of reality in the simulations with great accuracy in matching the results.