

基于ANSYS软件的降低破裂压力机理模拟

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ANSYS-based simulation of fracturing pressure reducing mechanism

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摘要

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摘要 针对深井压裂施工时各种降低破裂压裂方法的技术特点,基于ANSYS有限元软件,建立了裸眼完井和套管射孔完井两种应力计算模型,对压裂施工中井筒附近岩石应力变化进行了模拟计算,分析了不同深度的储层、不同岩石物性的储层及深穿透射孔和酸化预处理对储层的破裂压力的影响。结果表明,储层岩石力学性质中杨氏模量对破裂压力的影响较大,表现为随杨氏模量的增加,岩石破裂压力增加,而岩石的泊松比变化对破裂压力影响较小;酸化预处理可以降低岩石的杨氏模量;射孔深度不同,对降低破裂压力的作用随孔深的增加而减弱。在应用中应该根据情况选择优化孔眼长度。

关键词: [ANSYS软件](#) [应力](#) [水力压裂](#) [破裂压力](#) [压裂开采](#)

Abstract: According to characteristics of various fracturing pressure reducing techniques for fracturing operation in deep wells, this paper established stress calculation models for open hole completion and casing-perforated completion using the ANSYS software, and calculated the rock stress near the wellbore during fracturing. We also analyzed the effects of various factors on fracturing pressure, such as reservoir burial depth, reservoir rock physical property, deep penetration perforation and acidification pretreatment. The results show that the Yang' s modulus of reservoir rock has great influence on the fracturing pressure. Fracturing pressure of rocks increases with the increasing Yang' s modulus. In contrast, Poisson' s ratio has less influence on the fracturing pressure. Acidification pretreatment may reduce the Yang' s modulus. The effect of perforating depth on reducing fracturing pressure decreases as the perforating depth increases. In field operation, the perforating depth needs to be optimized based on the well condition.

Keywords: [ANSYS](#) [stress](#) [hydraulic fracture](#) [fracturing pressure](#) [fracturing production](#)

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