عنوان مقاله:
Formation Strengthening Via Wellbore Cooling; Description and Modeling

محل انتشار:
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خلاصه مقاله:
Some formations present rather narrow (or almost non-existent) operational mud weight window. These formations tend to be weak thus requiring high mud weight in order to avoid borehole collapse, while simultaneously exhibiting low fracture gradients. ‘Formation Strengthening’ is to widen/broaden mud weight window through variety of methods by mainly focusing attention on ways to increase fracture gradient. Decrease in sand/fine particles which inherently reduce nearwellbore permeability, eliminating unnecessary casing strings (especially intermediate strings or drilling liners), reducing time of drilling by decreasing tripping (non-drilling or flat) time and speeding up rate of penetration, through which cost of drilling decreases considerably, are main advantages of this rather newly introduced method. The purpose of this paper is to propose and evaluate the use of wellbore cooling, in combination with more classical strengthening processes, to permanently increase the fracture gradient without the risk of circulation losses inherent in the stress cage method. This approach involves lowering the temperature of the drilling mud; thus, reducing the hoop stress at the borehole wall and then ‘setting’ the stress cage in the standard manner. Tensile cracks can then be induced at significant lower mud weights. Given the typical thermal conductivity properties of rocks, the tensile stresses induced by cooling (and consequently, the created fractures) will tend to be confined to the near wellbore region

کلمات کلیدی:
formation strengthening, stress case, fracture pressure, wellbore cooling, mud weight window, tangential stress