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## 钻井工程

### 地应力类型影响定向井井壁稳定的规律

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#### 摘要:

定向井井周应力状态和井壁稳定性规律与直井有着明显的差别, 开展地应力类型对定向井井壁稳定性的影响规律研究, 对定向井井眼轨迹设计具有一定的指导作用。为此, 根据正常、走滑和反转三种地应力类型, 深入分析了定向井井斜角和井眼方位对井壁坍塌破坏的影响规律。结果表明: ①随着井斜角的增加, 正常和反转地应力类型的井壁稳定性逐渐变差, 即直井比定向井或水平井井壁稳定性更好; ②随着井斜角的增加, 走滑地应力类型的井壁稳定性逐渐增强, 即水平井井壁稳定性最好; ③定向井钻井或完井过程中, 井壁稳定的最优钻井方位与最大水平地应力方向的夹角按正常地应力、走滑地应力和反转地应力类型依次为 $90^\circ$ 、 $45^\circ$ 和 $0^\circ$ 。

关键词: [地应力类型](#) [定向井](#) [井壁稳定](#) [井眼轨迹方位](#) [正常地应力](#) [走滑地应力](#) [反转地应力](#)

### Laws of the effects of earth stress patterns on wellbore stability in a directional well

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#### Abstract:

The earth stress condition around the wellbore and the borehole stability laws of a directional well are significantly different from those of a vertical well, so it is important for operators to study the laws of effects of earth stress patterns on wellbore stability when making the well trajectory design of a directional well. In view of this, how directional well inclination and azimuth affect borehole caving are analyzed under normal, strike slip, and reverse earth stress conditions respectively. In conclusion, under the normal or reverse earth stress pattern, wellbore stability will gradually become worse with the increase of well inclination, which means that a vertical well has a higher wellbore stability than a directional well or a horizontal well in such situation. However, under the strike slip earth stress pattern, wellbore stability will gradually become higher with the increase of well inclination, which proves that a horizontal well has the highest stability. During directional well drilling and completion, for the highest wellbore stability to be achieved, the angles between the optimum drilling azimuth and the maximum horizontal in situ stress should be  $90^\circ$ ,  $45^\circ$  and  $0^\circ$  respectively for normal, strike slip and reverse earth stress patterns.

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