岩石力学与工程学报 » 2012, Vol. 31 » Issue (7) :1399-1405 DOI:

钻井液浸泡下深部泥岩强度特征试验研究

卢运虎1，2，陈 勉1，金 衍1，滕学清1，2，吴 文3，刘绪全1*

(1. 中国石油大学 油气资源与探测国家重点实验室 北京 102249；2. 中国石油塔里木油田分公司，新疆 库尔勒 841000；
3. 中国科学院武汉岩土力学研究所 岩土力学与工程国家重点实验室，湖北 武汉 430071)

EXPERIMENTAL STUDY OF STRENGTH PROPERTIES OF DEEP MUDSTONE UNDER DRILLING FLUID SOAKING

LU Yunhu1，2，CHEN Mian1，JIN Yan1，TENG Xueqing1，2，WU Wen3，LIU Xuquan1*

(1. State Key Laboratory of Petroleum Resources and Prospecting，China University of Petroleum，Beijing 102249，China；2. Tarim Oil Field Company，Petro China，Korla，Xinjiang 841000，China；3. State Key Laboratory of Geomechanics and Geotechnical Engineering，Institute of Rock and Soil Mechanics，Chinese Academy of Sciences，Wuhan，Hubei 430071，China)

摘要 参考文献 相关文章

Download: PDF (439KB) HTML 1KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 针对钻井液作用下深部泥岩破坏的关键技术难题，通过室内试验分析钻井液浸泡下深部泥岩强度弱化规律，并从微观角度分析试样发生变化的机制。研究结果表明：(1) 钻井液浸泡下，随取芯夹角增大，岩石强度先增大后减小，岩石强度降幅高达49.5%～54.7%；随着围压增加，取芯夹角为0°和90°时岩石强度增幅较低，仅为26.4%～39.2%。(2) 泥岩弹性模量随钻井液作用时间的增加而降低，随取芯夹角的增加呈现先增大后减小的变化规律，泊松比变化规律则相反。(3) 与内摩擦角相比，泥岩黏聚力变化规律性强，0°和90°条件下黏聚力降低幅度较大，最高达67.3%；其他情况下泥岩黏聚力变化幅度不大。(4) 钻井液滤液的渗入导致泥岩内部裂缝缝尖应力强度因子增加、临界断裂韧性降低、裂缝扩展，这是泥岩强度降低的根本原因。同时，钻井液滤液改变了层理面填充物的矿物成分，降低裂缝面的摩擦因数，加剧岩石强度的降低。

关键词： 岩石力学 深部泥岩 强度 取芯夹角 浸泡时间 钻井液界面性质

Abstract： According to the key technical problem of deep mudstone failure under drilling fluid soaking，the weakening law of strength is analyzed by the laboratory test；and the changing mechanism of core samples is analyzed through microcosmic angle. The result shows that：(1) Under the drilling fluid soaking，the mudstone strength increases first and then decreases with increase of coring angle. The decreasing range of strength is up to 49.5%－54.7%. With the increase of confining pressure，the increasing range of strength is lower and it is only 26.4%－39.2% with coring angles of 0° and 90° . (2) The elastic modulus of mudstone decreases with the increase of soaking time，and increases first and then decreases with the increase of coring angle. But the change law of the Poisson's ratio is opposite with that of the elastic modulus. (3) Comparing with the internal friction angle，the change of mudstone cohesion presents stronger regularity. The decreasing range of cohesion is larger with coring angles of 0° and 90° ，and it reaches 67.3%；but the change range of cohesion is small under other coring angles. (4) Because of the invasion of drilling fluid，the stress intensity factor of crack at the tip increases；the critical fracture toughness decreases and the cracks propagate，which is the basic reason for strength decrease of mudstone. Simultaneously，mineral composition of the fitting in bedding surface is changed by the action of drilling fluid. So，the friction factor crack face decreases and the decrease of mudstone strength is intensified.

Keywords： rock mechanics deep mudstone strength coring angle soaking time drilling fluid interfacial property

Service
把本文推荐给朋友
加入我的书架
加入引用管理器
Email Alert
RSS
作者相关文章

引用本文: