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摘要　声波时差测井数据的精度直接关系到油气层评价、油气储量计算和合成地震记录等的质量.本文通过数值模拟首次讨论了扩径段厚度对双发双收声系时差记录的影响程度.在径向扩径量一定条件下，当井轴方向的扩径厚度达到某一个特定数值时，时差测量误差最大；而大于或者小于该扩径厚度特定值时，测量误差都会变小.当井径大于或者等于扩径临界值时，接收探头记录的首波走时中将含有扩径段泥浆波走时的贡献.首次发现使扩径临界值取得最大值的井轴方向扩径厚度特征值.远离该厚度特征值，接收含有扩径段泥浆波走时的首波径向扩径临界值都会变小.第一次给出有关接收扩径段泥浆波走时的扩径临界值图版.

关键词　扩径厚度　声波时差　数值模拟

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The effects of borehole enlargement length on the slowness response of a dual transmitter and receiver acoustic logging system

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Abstract The precision of acoustic logs directly affects the quality of oil and gas formation evaluation, the oil and gas reserve computation and the synthetic seismic records. The characteristics of the responses of a logging system with two transmitters and two receivers at a borehole collapse interval were first simulated by numerical method. It has been found that when the length of hole collapse interval is equal to a specific value, the difference between the recorded values and the true values reaches maximum, while the hole collapse interval is longer or shorter than this value, the differences become smaller, proportionally to the deviation from the value. If the borehole diameter is equal to or large than the critical diameter, mud wave will first arrive to receiver through the hole collapse interval. In a bed with a constant slowness, the critical diameter reaches maximum when the length of borehole collapse interval is equal to the specific value. The critical diameter becomes smaller for any other lengths of the borehole collapse intervals. A chart for determining the critical diameter is developed to identify the borehole conditions of the mud wave being the first arrival in the received signals.

Key words Borehole collapse interval　Slowness　Numerical simulation

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