

多相流和计算流体力学

交联聚合物溶液在孔隙介质中的流动与滞留行为

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摘要

在内径为40 mm、长度为1500 mm的填充砂管中, 在线测量了由部分水解聚丙烯酰胺和柠檬酸铝所形成的交联聚合物溶液在填充砂孔隙介质中的流动和滞留特性, 考察了交联聚合物溶液的流动形态及流动速度对孔隙封堵位置的影响。结果表明, 交联聚合物溶液在孔隙介质中的流动过程中, 经过多次压力脉动最终导致一种局部性的非均匀封堵; 随着流动线速度的增加, 封堵位置与交联聚合物注入口间的距离呈非线性增大; 对应于封堵现象的发生, 可能存在一个临界注入量, 只有当交联聚合物溶液的注入量大于该临界值时, 才会对孔隙介质产生封堵作用。

关键词

[交联聚合物溶液](#) [多孔介质](#) [流动](#) [封堵](#)

分类号

Flowing and plugging behavior of linked polymer solutions in porous media

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Abstract

Linked polymer solutions (LPSs), consisting of partially hydrolyzed polyacrylamide and aluminum citrate for enhanced oil recovery, were prepared and their flowing and diverting behavior in an unconsolidated sand pack was investigated by the core flooding method in the present study. Using a mixture of a polymer solution and a crosslinker solution prepared prior to injection, the experiments were conducted in a sand pack holder of 1500 mm in length and 40 mm in I D, filled with unconsolidated quartz sands. The effects of interstitial velocity and LPS injection amount on the plugging location were studied by on-line measurements. The results showed that LPSs flowed through the sand pack in plug-flow. During the LPS injection, frequent pressure fluctuations took place and finally gave rise to non-uniform plugging at certain positions in the sand pack, where abrupt increase in pressure drop appeared. The distance from the inlet to the place where significant plugging occurred increased nonlinearly with increasing interstitial velocity. It was found that most possibly there existed a critical LPS injection amount, above which plugging would happen.

Key words

[linked polymer solution](#) [porous medium](#) [flow](#) [plugging](#)

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