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基于隐式离散极大值原理的聚合物驱最优注入策略

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摘要 为了获得聚合物驱油的最大利润,建立了确定最佳聚合物注入浓度的最优控制模型.
利用全隐式差分格式将连续模型离散化得到离散系统的状态方程.
通过隐含离散系统的极大值原理获得了该最优控制问题的必要条件.给出了基于梯度的数值求解方法,
在求解状态方程的过程中直接构造了伴随问题的系数矩阵.
通过一个三维聚合物驱模型的计算实例表明了所提出方法的可行性和有效性.

关键词 最优控制, 极大值原理, 聚合物驱, 注入策略.
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Optimal Injection Strategies for Polymer Flooding Using Implicit Discrete Maximum Principle

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Abstract In order to maximize the profits gained from oil recovery of polymer flooding, a discrete optimal control model is established for determining the best injection concentrate of polymer solution. The discrete states equations are obtained from continuous model of polymer flooding by full implicit difference schemes.
The necessary conditions of the optimal control problem are derived from implicit discrete maximum principle. A gradient based algorithm is presented to solve the problem numerically, in which the coefficient matrices of adjoint equations are directly constructed during the solution of states equations. A polymer flooding simulation example of three-dimensional model shows the practicality and efficiency of the proposed approach.

Key words Optimal control discrete maximum principle polymer flooding injection strategies.

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