

# Adsorption of Aqueous Oil on Soils and Its Analysis of Effective Factors

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**Abstract:** On the basis of the investigation into the oil contamination of soil-water-plant systems in the Shenyang-Fushun irrigation field, surface soils and bottom soils were sampled along 3 representative profiles and their major physical and chemical properties were analyzed. Kinetic curves and isotherms of aqueous oil adsorption on soils were measured and influence of organic matter, clay particle and salt contents on the adsorption was evaluated. The research results show that the equilibrium period of the adsorption is 20—24 hours, and all the adsorption isotherms are straight. In addition, it was found that the soils release some oil when the aqueous oil concentrations are lower than certain values.

**Key words:** soil; aqueous oil; adsorption.

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## 地下水流数值模拟前后处理软件的设计与实现

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国际上通用的 MODFLOW 核心程序的软件前后处理功能强, 可视化做得很成功, 因其具有实用性、易操作性而在国内外应用较多, 而其核心程序刻画方面却存在着一些需要改进的地方; 国内的地下水数值模拟程序虽然水文地质条件刻画较强, 但前后处理仍有大量工作可做。

地下水流数值模拟前后处理主要包括网络生成、插值、分区图形的绘制及等值线的绘制, 各部分的工作量大而且繁琐, 方便快捷的前后处理软件已成为数值模拟工作者迫切的需要。

对于关键技术问题之一——二维网络自动生成, 从 20 世纪 70 年代开始, 出现了大量的网格单元自适应生成算法。波前推进法存在时间效率相对较低的缺点; Delaunay 三角剖分方法剖分时存在产生

细长型三角形的缺点, 本设计综合了这 2 种方法, 在网络生成过程中插入适当数量的新结点, 使三角网络质量得以改善, 实现了三角网络的自动剖分。

对于关键技术问题之二——克立格法, 它是一种对空间参数分布数据求最优、线性、无偏内插估计量的方法。克立格方法的基本出发点是待估计值  $V(x_0)$  可用所有测量值  $V(x_i)$  的线性组合来表示。

记  $w_i$  为观测点  $i$  的权系数;  $n$  为观测点的个数, 要使偏差最小, 有如下方程

$$\begin{cases} \sum_{j=1}^n w_j C_{ij} + \mu = C_{i0}, \\ (i=1, 2, \dots, n; j=1, 2, \dots, n), \\ \sum_{j=1}^n w_j = 1. \end{cases}$$

这里,  $\mu$  为拉格朗日常数;  $C_{ij}$  为变差函数;  $C_{i0}$  为协方差  
(下转 582 页)

slide [ A ] . Typical landslides in China [ C ] . Beijing: Science Press, 1988. 200— 210.

# Analysis of Movement Process of Landslide in Reservoir and Calculation of Its Initial Surge Height

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**Abstract:** The movement of landslide in reservoir is divided into two stages, which are movement on ground and movement below water level, and the forcing characteristics of both stages are analyzed in this paper. The Newton law and the basic principles of kinematics are used to solve velocity and acceleration of landslide when it moves on ground surface, and the terminal conditions of stage on ground are considered as the initial conditions of stage below water level. The resistance formula in flow field and viscous force formula are applied to solve velocity and time of landslide when it moves below water level. At last, the momentum theory is adopted to calculate surge height. This paper takes Xintan landslide in the Three Gorges reservoir as the example and takes use of vertical slice method to calculate speed on ground surface, time below water level and surge height of each slice. It comes to the conclusions that the landslide firstly accelerates, then decelerates on surface, and the relationship between time and speed below water level is arc tangent and shows that the surge height keeps a great correlation with the height of slice.

**Key words:** viscous force; momentum theory; surge; Xintan landslide.

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(上接 567 页)

差函数. 此方程组含有  $n + 1$  个方程,  $n + 1$  个未知数, 由此可以解线性方程组得出未知数  $w_i$  及  $\mu$ .

对于关键技术问题之三——三角网格等值线绘制, 主要分以下 3 个部分: (1) 遍历各个三角单元, 寻找等值点; (2) 跟踪等值点, 判断等值线是开曲线还是闭曲线; (3) 对每条等值线完成标注与光滑曲线连接工作.

以陕西某处地下水流数值模拟研究项目为例, 用本软件进行了地下水流数值模拟前后处理. 根据地下水流模型初始边界及拟设的点和线, 利用软件进行网络自动生成, 生成的三角剖分图如图 1 所示, 总结点 1 440 个, 总单元 2 697 个. 对于已知水位点数据利用 Kriging 插值得所有结点数据. 限于篇幅, 三角网络等值线图、初始图形和分区图形没有

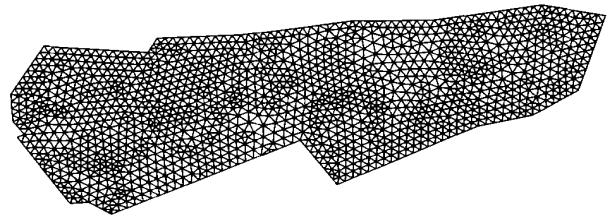


图 1 三角网络

Fig. 1 Triangle element mesh

显示.

对于地下水流数值模拟前后处理软件的设计, 笔者作了一个大胆的尝试, 设计的软件包括数值模拟可能涉及到的三角网络自动生成、插值、绘等值线、分区文件的显示等部分. 设计的软件基本满足地下水流数值模拟的要求.