ANALYSIS OF SOLID -LIQUID SEPARATION IN RAPID SAND FILTRATION

Emanoil BÂRSAN, Călin IGNAT

The water filtration is a unit process of water treatment which consists in the separation of suspensions from water by passing water through a quartz sand bed of 0.8 -1.2 m thickness.

By passing water with suspensions through porous medium, under the action of hydraulic gradient, the porous medium retains in somewhat proportions, the solid particles by different mechanisms. There takes place a mass transfer from the water subjected to filtration to the porous medium.

The clarifying process of water and the retaining the suspensions in porous medium is modeled by the following relations:

1. The kinetic equation which defines the probability of retaining the suspensions in filter medium;

2. The mass transfer equation which expresses the transfer of suspensions from the water subjected to filtration at the surface of the filter medium.

Starting from the mass transfer equations for the filtration process there were applied different solutions for the evaluation of this process.

Thus Ives (1975) used the Bessel functions of i order, and Adin and Rebhun (1977) the characteristics method for solving the coupled equations of the filtration process.

In this paper it is adapted a simplified numerical method which consists in the calculation on depth and time of the water concentration of suspensions (C) and specific deposit (σ) in terms of C and σ of the anterior steps, starting from the initial conditions (clear filter).

Also, automatically, it is realized a graphical representation of this evolution.

Because of the reduced time for the calculation and graphical representation of the mass transfer there can be analyzed o multitude of variants from which there must be chosen the rational solution for making - up the filter bed (thickness, granulation, porosity, filter surface).