The calculation formula for the moisture content type Richards equation is as follows:



Among them,  represents water content,  represents depth, and  represents time;  represents the unsaturated permeability coefficient, and  represents the unsaturated diffusion rate. According to the Mualem model, the calculation formulas for  and  are as follows:





In the formula,  is the permeability coefficient of saturated soil;  is the fitting parameter, set to 0.5;  is an empirical function taken from the VG model;  is the volumetric moisture content, which is:



 is the saturated moisture content, and  is the residual moisture content.

The relationship between matrix potential  and moisture content  in unsaturated soil is characterized by the VG model as follows:



In the formula,  、 and  are empirical parameters in the VG model.

The initial and boundary conditions are as follows:



Some of the parameters are shown in the table below:

|  |  |
| --- | --- |
| Physical parameters | Value |
|  | 0.46 |
|  | 0.02 |
|  | 0.944 |
|  | 1.29 |
|  | 1.33 |
|  | 0.9 |