A three-dimensional unstructured mesh generation method for environmental reservoir simulation analysis

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ABSTRACT

This work presents a three-dimensional unstructured mesh generator for the analysis of hydroelectric power plants reservoirs using finite element methods. In order to obtain an accurate simulation of the physical flow of interest, the discrete mesh needs to consider adequately the geophysical data employed for the definition of the domain. The proposed algorithm is practical, stable and able to deal with different types of geophysical input data producing well conditioned three-dimensional meshes.

We implemented the proposed algorithm in C++ in the context of a project for the analysis and evaluation of environmental impacts of hydroelectrical reservoirs. The algorithm is able to deal with several kinds of geophysical data, as well as, data with a huge relationship between the average of horizontal width and depth, which is a common situation in reservoir engineering.

An advantage of the algorithm is the point insertion routine. This allows to easily implement a refinement of the mesh in order to increase the approximation of the simulation.

References


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