Model Matematik Aliran Air Bawah Bendung

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Abstract

Dam is a structure which is the main function is to dammed up the flow of the river so that it gets the sum of a specific volume of the water. The dam can be built from concrete, stone, sand, clay or combinations between them. As it function to resist the water flow of the river, the dam must be controlled from its displacement or turning over came from the water pressure. On the clay-typed dam, the safety value is also determined from the water "rembesan". As its affected to the stability of the dam, "rembesan" can caused the leak of the water to the dam and then become ruin. To anticipate those phenomenon of "rembesan" need a "pengamatan cermat" to the "rembesan" activity of the dam so the development of "rembesan" activity can be detected, find the problem and then appropriate actions can be taken to solve them, and then more bigger problem can be avoided. The next important aspects are the dam's "rembesan" and "bocoran". On a specific circumstances, beside the "rembesan" and "bocoran" which can caused loosing the water, the "bocoran" can broke down the stability of the surrouding structure near the dam. The underground "rembesan" on a dam can be determined through numerical model with the finite element method. The utilization of the finite element method on the case of the dam "rembesan" seem like a new method compared with the finite difference method.

The problem is how to design a mathematical model of equipotential line to determine the speed of underground "rembesan" on a dam, so it can be used to simulate the water flow under the dam. This can be solved using a simple rectangle shape and the element consist of nodal-triangle element (linier). Data on this research including the model domain geometry data. Model domain geometry data including the shape of the dam and the clay under it. The domain geometry data was created with Fasttabs software. The shape of domain geometry is divided into a small triangle element.

The analysis shows difference computation about 8%. This 8% of difference can be caused by the dimension of the element and the process still using nodal-triangle element (three nodes). But those result still can be used to draw the equipotential line of underground water flow. The utilization of the finite element method on modelling the water flow below the dam can be developed for more complicated shapes.

Keyword : ***underground water flow, finite element method, mathematic modelling.***