3D Landscape Simulation of Leveling Hills

- New release of plug-in for visualizing changes of land shape -

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(Key Words)

1. Background

Based on the latest version, 2.09, of the Landscape Simulation System[1)] which was published March 14th, 2011, we developed a new plug-in (flow.dll) for simulating change of landscape caused by leveling of hills, which we released in December 16th, 2011.

After the Great East Japan Earthquake, the Geography Survey Institute elaborated lots of data, which identify the areas inundated by the tsunami, precise land shapes after the tectonic deformation (2m and 5m mesh DEM) and digital maps of objects which classify the buildings and infrastructure into 3 damage level categories. These accurate data, which are quite useful for planning the reconstruction and rehabilitation, had been available only in the metropolitan areas before the disaster.

2. Usage of the plug-in to simulate Leveling of Hills

At first, users load the DEM data of the target area, and convert them into the TIN model. On this land, the area to be leveled will be defined through plotting the vertices of surrounding polygons in the orthogonal view. Also, the desired altitude of the area and grading of cut & pile slopes can be numerically defined. After clicking the 'Execution' button, the system automatically calculates the cross-sections among land, slopes and created flat land, and shows it in the main window. If the result is not acceptable, the user can then cancel the operation and readjust the parameters before executing the calculation again.

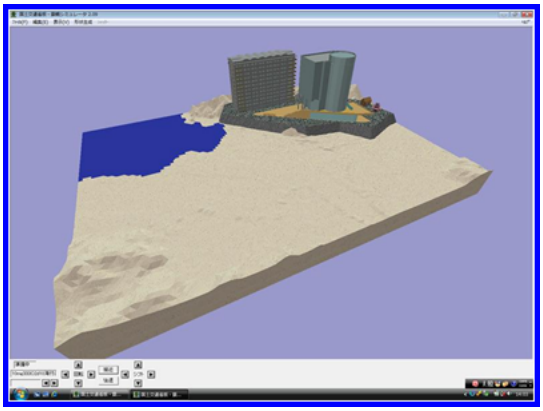

Figure 1. Example, elaborated by a child at a festival

Shapes of a continuous bank or ditch can be also modeled by this plug-in, by defining the narrow and long area to be leveled.

After testing this new plug-in by applying it to several actual land shape data, by normal and reasonable operations for modeling in a laboratory, it was tested by unexpected operations performed by innocent children who visited a festival held in our institute (Nov.19).

However, they could easily understand how to operate it to create flat land in a hilly area, and plotted houses and facilities on the created land. Then a conventional 'Walk-Through' simulation or 'Visible Area Analysis' was performed to check the views from the created land open to the ocean, or views of created slopes from the lower coastal land.

3. Usage, application and further improvements

The new plug-in has been freely available since Dec. 16th from our website[2)]. Anyone can attach it to the main system which is also freeware. Along with the publicly delivered land-shape data, community-level usage at affordable cost will be promoted. Planners or designers can also utilize this to create and edit the precise shape of a planned complex on sloping land consisting of house-lots at different levels.

Further improvements will be carried out on the data assimilation between e.g. accurate 3D data of a housing complex and the surrounding rough land shape. Also, volumes of cut and piled soil will be estimated through geometrical calculation.

In other related research, Augmented Reality viewing of the modeled 3D data on site, using the tablets was achieved by the end of February 2012. The permanent preservation of 3D data of lost houses or designed future plans, including un-adopted ideal ones, is another target of our research[3)].

[Reference]

1) "The Architecture of Landscape Simulation System Ver.2.09, provided by MLIT"
Research Report of NILIM No.42, March 14, 2011.
2) http://sim.nilim.go.jp/MCS/flow/flow1.asp
3) http://sim.nilim.go.jp/MCS/phi/phi.asp