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Literature review 2

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11/10/2010

Main article: "Verifying Scientific Simulations via Comparative and Quantitative Visualization" (IEEE Computer Graphics and Applications November/December 2010 pages 16-28)

Secondary article: "CAPTURING HALOS AT HIGH REDSHIFTS" (The Astrophysical Journal May 10th volume 642 number 2 pages L85–L88)

The main article I chose discusses the topic of accuracy when dealing with computer simulations of large scale models. When dealing with simulating massive environments such as the universe or the ocean, there is a lot room for error. There is also a lot of room for improvement in simulating such environments. There are many different simulations that will come up with different results and it would be nice to be able to check the accuracy of each. This article explains an attempt at this.

The secondary article discusses how to simulate dark matter halos with a high redshift. This is related to the main article in that it is a simulation on a large scale that can be checked for accuracy using the scientific method described. I will not pretend to understand all the formulas described in this article, but, after reading through it, it gives me some understanding about dark matter. Previously I had no idea dark matter formed shapes like halos or we could approximate it in this way. I just assumed since it emits no visible light, that it only existed in theory to fill an unknown variable in the gravitation equations for the known universe. Interesting but also as I realize is completely the opposite of this classes subject matter: we are dealing with visualization and here is this article about dark matter which cannot be seen. Even though that is the case, there are graphical models to represent the data about it. This secondary article goes into detail to show one way this is accomplished.

In the article "Verifying Scientific Simulations via Comparative and Quantitative Visualization" they give an example of how their verification process works using several simulation codes for the cosmos one of which is described by the secondary article. They also use another example of ocean simulations. Specifically they deal with sea surface height around

the globe. Using a four step approach they come up with 2d and 3d visualizations that display their findings. They really don't go into any detail on how they get from the data to the displays; which would be interesting to know. They instead focus on the scientific process used to come with them. My assumption is they used some kind of simple program to do this for them. I like how this article is written in a positive light: they are trying to help the people who create these simulations by given them a statistical analysis of its inconsistency's to promote future progress rather than try to debunk these simulations.

Main Article:

@ARTICLE{5560617,

author={Ahrens, James and Heitmann, Katrin and Petersen, Mark and Woodring, Jonathan and Williams, Sean and Fasel, Patricia and Ahrens, Christine and Hsu, Chung-Hsing and Geveci, Berk},

journal={Computer Graphics and Applications, IEEE}, title={Verifying Scientific Simulations via Comparative and Quantitative Visualization},

year={2010},

month=nov.-dec. ,

volume={30},

number={6},

pages={16 -28},

keywords={},

doi={10.1109/MCG.2010.100},

ISSN={0272-1716},}

Secondary Arcticle:

http://iopscience.iop.org/1538-4357/642/2/L85/pdf/1538-4357_642_2_L85.pdf

@ARTICLE{LA-UR-05-9198,

author={KATRIN HEITMANN1, ZARIJA LUKIC, SALMAN HABIB, AND PAUL M. RICKER},

journal={The Astrophysical Journal}, title={CAPTURING HALOS AT HIGH REDSHIFTS},

year={2006.},

month=May ,

volume={642},

number={2},

pages={L85–L88},

keywords={},

doi={10.1086/504868},

ISSN={},}