

THOUGHT EXPERIMENT AND COMPUTER EXPERIMENT - SIMILARITIES AND DIFFERENCES

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ABSTRAC. It was shown that though there are various differences between thought and computer experiment, there are also some similarities. Computer simulations, as representations of computer experiments, are shown to have the same proving ability as thought experiments. Both are using previous knowledge collected by the science in question, and extending it to new problems.

INTRODUCTION

In this paper we are trying to emphasize the similarities between thought experiments and computer simulations (as the most often representation of computer experiment); also, we shall try, through some logical steps, to extend the proving ability of thought experiments to the computer simulations, by showing that same arguments which show proving ability of thought experiments apply to the computer experiments.

This is shown by using one simple thought experiment (the one with an elevator, from General Relativity [1]) and one simple simulation (simulation of self-avoiding walks on fractals [3]). Comparing the two we are trying to shed some light on the problem.

ONE SIMPLE THOUGHT EXPERIMENT

First we shall try to formulate a working definition of thought experiment, with the help of Einstein's thought experiment with elevator:

Let us imagine an elevator in space, removed from influences of all gravitational mass, which moves with some acceleration. If acceleration is constant and equals g , man inside the elevator will feel like he is under Earth gravitational field. Conversely, in elevator that falls freely in Earth's

all previous knowledge accumulated from numerous experiments in form of theorems, lemmas and formulas.

References:

- [1] V. Babović, V. Ristić and D. Todorović, *Thought Experiment in Physics*, Collection of Scientific Papers of Faculty of Science Kragujevac, 4 (1983) (in Serbian)
- [2] B. Radenković, M. Stanojević and A. Marković, *Computer Simulation*, Faculty of Organizational Sciences, Belgrade (1999) (in Serbian)
- [3] S. Milošević, I. Živić, *Self-avoiding walks on fractals studied by the Monte Carlo renormalization group*, J. Phys. A: Math. Gen. 24, L833-L838 (1991)