

Strand 3: Learning Physics Concepts

Parallel Session 08.02

Date & Time: 04.07.2012 / 13:00 – 14:30

Room: D403 (3rd Floor)

Tablet based interactive GPS textbook – a new kind of an educational means

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Tablet base interactive textbook explaining GPS principles will be presented.

Explanation will be presented at the secondary school level, without using differential calculus, using only the vector calculus (scalar and vector product, basic equations used for solving vector equations). From physics, both Special and General Theories of Relativity are mentioned and their use explained. Namely, following the Special Theory of Relativity, the frequency of moving object is slightly, but remarkably lower than frequency of the clock staying in rest, whereas – in the opposite – following General Theory of Relativity, frequency of a clock staying in a weaker gravitational field (22 000 km from the Earth) becomes to be higher than those of the clock staying on the Earth. In a given example of GPS system, effect of the General Theory of Relativity is stronger than the contribution of the Special Theory of Relativity. Those effects are estimated only and presented as a given facts, among other verifying nay moment in evedyday's life both relativistic theories. In the opposite, the geometrical construction of the unknown position by cros/section of three spheres is discussed and explained in details to show the utility of general geometry. The more, some simulations are provided for the learner for the self/use of the numerical approximation to find an optimal solution in a realistic case when the received data are not prefect.

The presentation is an example of an everyday life „magic“ device and use of their powerful properties in teaching and learning. The new technology brought the new possibilities compared to the classical books or notebooks, namely transferability, interactivity, flexibility, web connection.

A complex cooperation of specialists in science (topics), programing (model, animation), pedagogy (scenario), fine arts (illustration and movies) with modern technology (animation, graphics) needed a multi-disciplinary cooperation and represents a particular cultural aspect.

This program will be presented on a tablet and in English. However, for the use on the secondary school, mutations in mother-tong-languages are more recommended (the Czech one was prepared simultaneously and is now ready, too).

Keywords: interactive textbook, tablet, GPS principle at secondary school level, multimedia