

ELEMENTS OF SYSTEM DYNAMICS DURING DISTANCE LEARNING OF PHYSICS LESSONS

Formulation of the problem. In today's world, the remote form of education, during which the educational process is carried out by using modern information and communication technologies, is gaining special relevance. Physics, as you know, belongs to the cycle of compulsory educational disciplines of natural science and mathematics, studied by students of technical specialties. At the same time, physics is traditionally one of the most difficult subjects for most students. Accordingly, the study of the effectiveness of distance learning of physics for students of technical specialties in quarantine conditions is relevant. [2]

Presentation of the main material.

Research of a thread pendulum (Learning new material)

The filament pendulum simulator can be found in the search engine at <https://exchange.iseesystems.com/public/isee/pendulumstory/index.html#page1> [3].

In this model, we investigate the effect of thread length, ball mass, and initial position on pendulum motion, ignoring the effects of friction and air resistance. You can then examine the oscillations of the pendulum, taking into account the friction and driving force.

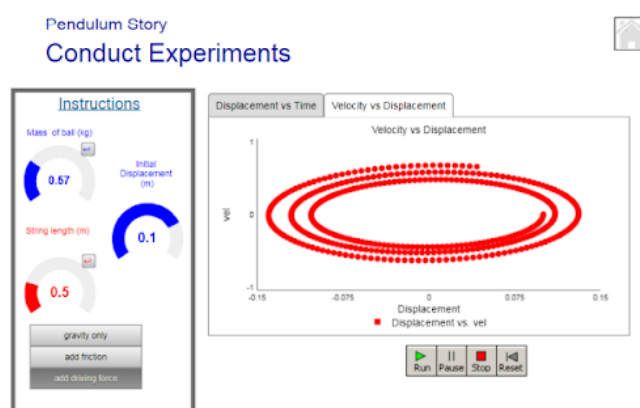


Figure 1. The change in speed from the movement of the pendulum

Figure 1 shows the change in speed from the movement of the pendulum for a ball weighing 0.57 kg, the length of the pendulum thread 0.5 m, with an initial displacement of 0.1 m and with the addition of driving force.

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Project activity.

Fig. 2 will find us with children consuming the reality of their pets. So we can compare the real speeds of cats or dogs living at home. This method of using system dynamics is suitable for the interest of 7th grade children in studying physics at school through short-term projects.

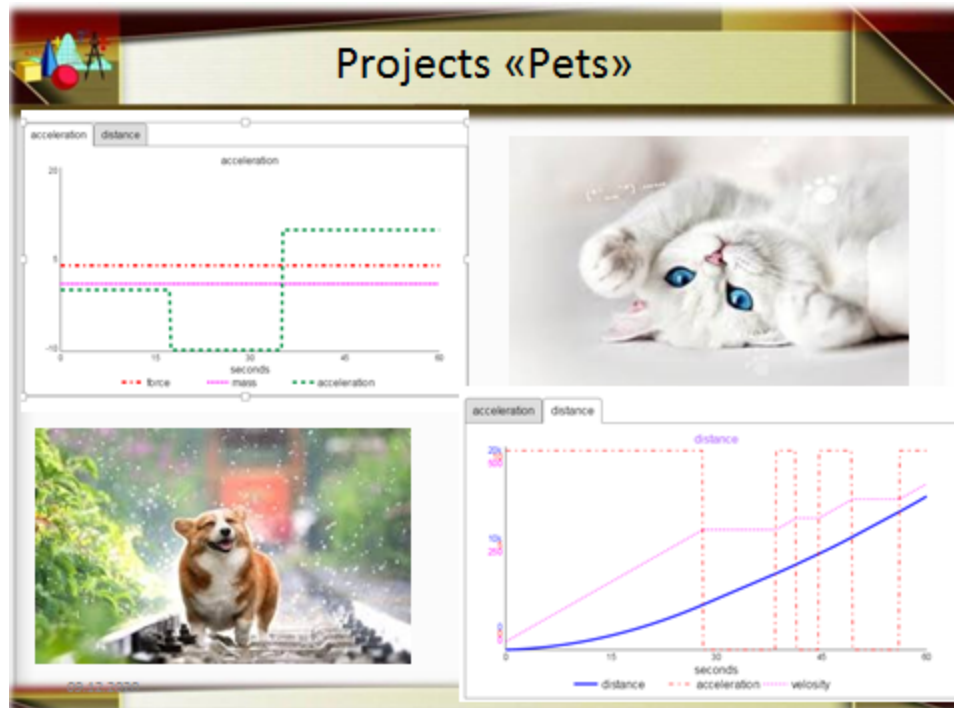


Figure 2. Children consuming the reality of their pets

Experiment.

If you like Xtreme sports, bungee jumping is the game for you. The sport is exciting. The pace is fast. And the risk is real! But maybe you don't have a bungee jumping facility nearby. Or maybe you don't have a strong desire to test the bungee cord with your life. If that's the case, virtual bungee jumping is what you want. And you can get it right here. Your challenge in the first round of experiments is to choose the best bungee cord for your weight. When you jump with the "best" cord, you will almost (but not quite) touch the pavement below the platform. Too few strands in your bungee cord will send you crashing into the pavement and too many will give you a short ride. In the second round of experiments, you can do bungee jumping on a variety of planets. You'll have complete control over the apparatus. You'll truly be able to boldly go where no person has gone before! You have two options for exploring the structure of this model. First, you can take a guided tour, in which you can walk through the essential structure of the virtual bungee, which is an idealized spring-mass system. Just hit the spacebar to walk through the key relationships that govern a simple harmonic oscillator (Fig.3).

Or, if you'd like, you can look at the model that was used for the second round of simulations. Your choice. In either case, when you're all done, you can click the home button to return to the main screen.

Adventures in Physics - Virtual Bungee Jumping Review Simple Experiment Results

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Instructions

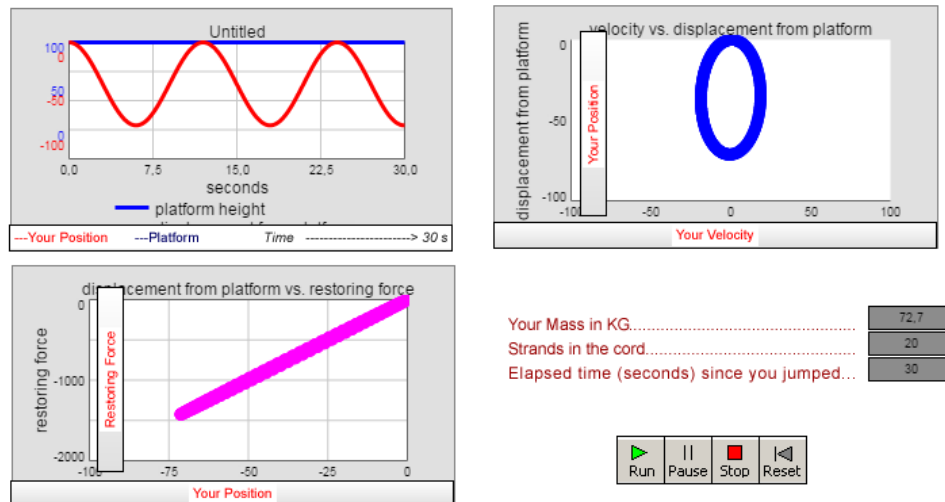


Figure 3. Harmonic oscillator

Conclusion. Experience in the introduction of system dynamics to the teaching of physics has shown that it not only eliminates the use of other methods and forms of training, but also facilitates their skillful combination.

Thus, system dynamics effectively contributes

- to the study of new material,
- the performance of experimental tasks,
- protection of projects during distance learning physics lessons.

The virtual environment stimulates interest in physics and improves performance in students.

References

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