

Mathematics for carousels and roller coasters: Challenging project work for engineering students

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An amusement park is full of examples, that can be made into challenging problems for students, combining mathematical modelling with measurement in the rides. For many years, the new students in the engineering physics program at Chalmers have visited the Liseberg amusement park, with group assignments, to be presented in written reports, as well as in oral presentations to student groups who have worked on other rides. The students have experienced the weightlessness in free fall and the large forces in roller coasters loops. They have observed the Coriolis effect using a little pendulum in slow carousels. They have also solved relatively straight-forward problems, such as working out and measuring periods in pendulum rides and train speeds in roller coasters. In addition they have investigated more complex questions such as: Does it matter what seat you chose in a roller coaster – and if so, how much? Can any speed difference between different trains be detected? How much mechanical energy is lost during the ride? What temperature do the brake fins reach after stopping the train? The authenticity of the tasks in enjoyable situations often lead to inspiring and enlightening discussions.