

1135-C5-3181      **William W Hackborn\*** ([hackborn@ualberta.ca](mailto:hackborn@ualberta.ca)), University of Alberta, Augustana Campus, Camrose, Alberta T4V2R3, Canada. *Resisted Projectile Motion: a Trove of ODE Applications/Projects.*

Problems involving a body moving vertically up or down, subject to air resistance of various kinds, are standard in ODE courses. Even so, such problems are still a source of novel results, worthy of student research projects. A source of more challenging applications/projects involves a body launched at an oblique angle: if the resistance on the body is proportional to its speed, the ODEs for the body's motion can be solved quite easily, but interesting questions can still be asked and answered. This talk, however, will focus on a body projected obliquely and subject to resistance varying (more realistically) as the square of its speed. What makes this case a trove of engaging projects is the fact that the solution can (it seems) be expressed only using intractable integrals, and so one must resort to qualitative approaches or approximations based on simplifying assumptions (such as a small launch angle, or weak resistance, for which a regular perturbation approach is fruitful) to analyze the solution. Leonhard Euler himself tackled this ballistics problem while in the service of Frederick the Great and described the solution qualitatively in addition to devising a numerical technique used on the battlefield as recently as World War II. (Received September 27, 2017)