

CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Friday, February 10

3:00 – 4:00 PM

Maria Sanford, Room 101

SOLVING DIFFERENTIAL EQUATIONS WITH SYMMETRY

ROGER BILISOLY

CENTRAL CONNECTICUT STATE UNIVERSITY

Abstract: Sophus Lie (1842-1899) was a noted Norwegian mathematician. As a student, he admired Galois's work showing how the discrete symmetries of the roots of a polynomial equation could be used to solve it. This led him to discover how the continuous symmetries of a differential equation could be used to find a solution. This talk focuses on three examples. First, solving the quadratic equation by using Galois theory applied to the symmetries of S_2 . Second, showing that the ordinary differential equation, $\frac{dy}{dx} = g(x)y + f(x)$ can be solved using a translational Lie symmetry, which shows that integrating factors arise from symmetry considerations. Third, examining the many symmetries of the Kepler Problem (solving of the equations of motion for two masses under the influence of Newtonian gravity.) Both conserved quantities such as angular momentum and Lie symmetries will be discussed. If you have taken calculus and are not afraid of differential equations, I encourage you to come.

To join us online use the following link: <https://ccsu.webex.com/meet/gotchev>

For further information: gotchevi@ccsu.edu; 860-832-2839;

<http://mathcolloquium.sites.ccsu.edu/>