CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Friday, November 13
2:00 – 3:00 PM
Maria Sanford, Room 101

SURFING THE SPACE OF INITIAL CONDITIONS OF AN ODE TO OBTAIN PERIODIC SOLUTIONS

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Abstract: Finding periodic solution of a differential equation is a difficult task with several applications. As motivation, let us look at the following artist's impression illustrating how the triple-star system Gliese667 would look from one of its planets.

It is most likely the trajectories of the stars in this system are given by a periodic solution of the three-body problem. Given an ordinary differential equation (ODE) $x'(t) = f(x(t))$ where x is a function with values in $\mathbb{R}^n$ and f is a function form $\mathbb{R}^n$ to $\mathbb{R}^n$, the problem of finding periodic solutions of the differential equation reduces to finding $n + 1$ numbers (a, T) with $a \in \mathbb{R}^n$ such that the solution of the ODE with initial condition $x(0) = a$, satisfies $x(T) = a$. In this talk we will explain a technique to produce periodic solutions of the three body like the one presented in the YouTube video https://www.youtube.com/watch?v=cfMflFNeKts. The technique has also produced families of periodic solutions with one of the three bodies moving along orbits like the following images: