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Birch and Swinnerton-Dyer Conjecture Clay Institute Millenium Problem Solution

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Abstract: *This paper presents the solution to the Birch Swimmerton problem. It entails the use of critical damping of a Mass-Spring-Dash Pod system which, when modelled mathematically, provide the equation that allows the solution of the zeta problem to be solved.*

1. Introduction

But in special cases one can hope to say something. When the solutions are the points of an abelian variety, the Birch and Swinnerton-Dyer conjecture asserts that the size of the group of rational points is related to the behavior of an associated zeta function $\zeta(s)$ near the point s=1. In particular this amazing conjecture asserts that if $\zeta(1)$ is equal to 0, then there are an infinite number of rational points (solutions), and conversely, if $\zeta(1)$ is not equal to 0, then there is only a finite number of such points.

2. Equation of Motion

From Verruijt, we know the equation of motion for a mass –spring- dashpod system is:

m∗d2u/dt2+c∗du/dt+ku=0

So, taking the resonant frequency into account, the equation from Verruijt becomes:

d2u/dt2+2zw0∗du/dt+w02u=0

Where w0=resonant frequency and z is a measure of the system damping.

At critical damping, the characteristic equation is the golden mean function:

x−=1/[x−1]

Or,

x2−x−1=0

The roots to this equation are, of course, -0.618, 1.618.

VALUE FOR i-the imaginary number

Now, before examining zeta z in equation form, we calculate a real value for the imaginary i=sqrt(-1)

[1−i]=1/[(1−i)−1]

1−i=1/−i

−i=1/[1−i]

i=1/[i−1]

x=1/[x−1]

x=-0.618, 1.618

So, sqrt(-1)= -0.618, 1.618

DAMPING RATIO ZETA z

Now, zeta=z=damping ratio=w/w0:

du0/dw=0:w/w0=√[1−2z2]

Algebraically:

du0/0=dw

w=w0∗sqrt[1−2∗z2]

Taking the derivative:

du0/0=dw=w′=[w0∗(1−2z2)1/2]′

w0/2∗(1−2z2)1.5]/1.5

In the Birch conjecture, there are two possibilities to consider. They are:

z(1)=0 and z(1)(not=)0

In the first case:

0=w0/3[(1−2(1)2]1.5

0=w0/3(11.5)

W0=0

Z(1)=0,w0=0

CRITICAL DAMPING

In the second case, we have critical damping. z(1) (not =)m 0

Say z(1)=1

1=w0/3[(1−2(12)]1.5

w0=3

Or w0=C1 w0 is a real number.

In case 1 again:

Z(1)=0,w0=0

du/dw=0w/w0=√[(1−2(z2)]

w/0=sqrt[(1−2(z)2)]

w=0

w/w0=0/0 Dividing by zero has infinite solution.

Now, finally, in the critical damping case:

du/dw=0

w/w0=√[(1−2(z2))]

w/C1=√[(1−2(12))]

w=√(−1)(C1)

We know sqrt(-1) is =-0.618, 1.618

So, w=-0.618 0r 1.618

w/w0=0.618 C1/C1=0.618

Therefore there is a real solution to z at critical damping.

3. Conclusion

Simple Mechanics combined with knowledge of the zeta function and the value of the imaginary number provide the ingredients to solve the Birch and Swinnerton-Dyer Conjecture.

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