

# SIMULATING MISSILE TRAJECTORY WITH IODES

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Modeling and Simulation Final



## Introduction

In a ballistic missile trajectory simulation, the system of differential equations used to describe the ballistic model is a highly complex system. In particular, the six-degree of freedom model used most frequently, consists of a system of twenty-one 2nd order ordinary differential equations, which are to be solved for the ballistic missile’s components of acceleration, velocity, and position at discrete time intervals. The usual method for simulating missile trajectory is the 4th Order Runge Kutta method (commonly called RK4), which is used to approximate a Taylor Series method that needs an initial condition of time and the function itself to be given. A newer algorithm, called the Parker-Sochacki Method (PSM for short), which uses the Power Series instead of the Taylor Series, is what this report is going to be diving into, as there are certain advantages compared to the RK4 system that is typically used in most applications today.

## Assumptions

## Equations

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## Model Verification



## Figures

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## Conclusion

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## References

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