# Domain Specific Language for high performance computing

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## 1 Abstract

## 2 Introduction

### 2.1 Background

In astrophysics and astronomy, to numerically calculate the dynamical evolution of N particles interacting gravitationally, N-body simulations are required. Figure 1 shows the equation for interparticle interactions in N-body simulations. If the equation is naively computed, the time complexity of calculation of interparticle interactions is $O(N^2)$, where N is the number of particles. Therefore, parallelization is required to speed up numerical simulations. To write a parallelized code for a numerical simulation, a user needs to understand the architecture of computer systems in detail. If a parallelized code is automatically generated by only describing the formulas and data of the numerical simulation, the above problems are solved.

### 2.2 implemented DSL

### 2.3 parallelization

### 2.4 Aim of this paper

## 3 Method

### 3.1 Use Sympy for DSL development.

## 4 Conclusion

## 5 Acknowledgement