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Bachelor Thesis in Physics
submitted by

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Gas accretion onto eccentric planets

This Bachelor Thesis has been carried out by Vincent C. Mader at the
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Abstract

Zusammenfassung

Preface

Acknowledgements

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Chapter 1

Introduction

Protoplanetary disk

- observations
- mathematical description
  - fluid dynamics
  - what kind of approximations are necessary?
- numerical approach

FARGO2D1D algorithm

Accretion mechanisms

Two different mechanisms:

1. Machida et al. 2010, accretion
   runaway accretion when $m_{core} < m_{envelope}$
2. Kley 1999, accretion

Hill sphere

The Hill sphere is the region around an astronomical body in which its gravitational influence dominates the attraction of sattelites [4]. If a body with mass m orbits a bigger object with mass M with a semi-major axis a and eccentricity e, the radius of the Hill sphere can be approximated (why only approximately?) by

$$r_H \approx a(1-e)\sqrt[3]{\frac{m}{3M}} \tag{1.1}$$

Chapter 2

Theory

Chapter 3

Numerical Techniques

3.1 The FARGO2D1D Algorithm

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Chapter 4

Results

Chapter 5

Summary

Bibliography

[1] *Lorem ipsum dolor sit amet*
https://www.youtube.com/watch?v=dQw4w9WgXcQ

[2] *Lorem ipsum dolor sit amet*
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[4] D.P. Hamilton & J.A. Burns (1992). "Orbital stability zones about asteroids. II - The destabilizing effects of eccentric orbits and of solar radiation". *Icarus*. **96** (1): 43-64
https://www.sciencedirect.com/science/article/pii/001910359290005R

Declaration

Ich versichere, dass ich diese Arbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe.

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