

PERTURBED UNIVERSES AND INFLATIONARY MODELS

MSci. THESIS

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1 Acknowledgments

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2 Abstract

The aim of this project is to investigate inflationary models and discover new models that give near scale invariance in accordance with Cosmic Microwave Background data.

3 Introduction

3.1 Cosmic Microwave Background (CMB)

3.2 Cosmological Problems

4 Theory

4.1 Friedmann Equations

4.2 Inflation

4.3 Mukhanov Sasaki Equation

4.4 Power Spectrum

4.5 Spectral Index

5 Matching Conditions

5.1 Jacobi Elliptic

5.2 Constant w

6 Hamiltonian Jacobi

6.1 Outline

The evolution of scalar fields is described by the Klein [1] Gordon Equation

$$\ddot{\phi} + 3H\dot{\phi} + V'(\phi) = 0 \tag{1}$$

$$H^2 = \frac{8\pi}{3m_{pl}^2} \left[\frac{1}{2} \dot{\phi}^2 + V(\phi) \right] \tag{2}$$

6.2 Intermediate Inflation

6.3 $n_s = 1$

6.4 $n_s \neq 1$

6.5 Proof of Slow roll

6.6 Equation of State

6.7 Potential

7 Conclusion

References

- [1] Herbert Goldstein. *Classical mechanics*. Addison-Wesley, Reading, Mass. ; Wokingham, 2nd ed. edition, 1980. ID: 44IMP_ALMAS2141267570001591.