



High Energy Physics - Theory

# Dynamics of Cosmological Perturbations in Multi-Speed Inflation

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We study a multi-field inflationary theory with separable Lagrangian, which has different speed of sound for each field. We find that the fields always coupled at perturbative level through gravitational interaction. We show that if the coupling terms among the perturbation fields are weak enough, these fields can be treated as a combination of decoupled fields, which are similar to normal modes in coupled oscillation. By virtue of such fields, the curvature perturbation at the horizon-crossing can be calculated up to the leading order of slow variation parameters via  $\delta \mathcal{N}$  formalism. Explicitly, we consider a model of multi-speed DBI inflation, and calculate the power spectrum in detail. The result depends on the ratio of different speeds of sound, and shows an apparent amplification when the ratio deviates from unity.

Comments: 22 pages, 2 figures. References added

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