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Anisotropic inflation with coupled p -forms

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We study the cosmology in the presence of arbitrary couplings between p -forms in 4-dimensional space-time for a general action respecting gauge symmetry and parity invariance. The interaction between 0-form (scalar field ϕ) and 3-form fields gives rise to an effective potential $V_{\text{eff}}(\phi)$ for the former after integrating out the contribution of the latter. We explore the dynamics of inflation on an anisotropic cosmological background for a coupled system of 0-, 1-, and 2-forms. In the absence of interactions between 1- and 2-forms, we derive conditions under which the anisotropic shear endowed with nearly constant energy densities of 1- and 2-forms survives during slow-roll inflation for an arbitrary scalar potential $V_{\text{eff}}(\phi)$. If 1- and 2-forms are coupled to each other, we show the existence of a new class of anisotropic inflationary solutions in which the energy density of 2-form is sustained by that of 1-form through their interactions.

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