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The Early Universe f^2FF Model of Primordial Magnetic Field at Natural Inflation ANWAR ALMUHAMMAD, RAFAEL LOPEZ-MOBILIA, University of Texas at San Antonio — We study the simple gauge invariant model f^2FF as a way to generate primordial magnetic fields (PMF) in Natural Inflation (NI). We compute both magnetic and electric spectra generated by the f^2FF model in NI for different values of model parameters and find that both de Sitter and power law expansion lead to the same results at sufficiently large number of e-foldings, as expected. We also find that the necessary scale invariance property of the PMF cannot be obtained in NI in first order of slow roll limits under the constraints derived from the recent BICEP2 results. Furthermore, if these constraints are relaxed to achieve scale invariance, then the model suffers from backreaction problems for almost all values of model parameters. We show that there is a narrow range of the height of the potential Λ around $\Lambda_{\rm min} \approx 0.00460 M_{\rm Pl}$ and of the commoving wave number k around $k_{\rm min} \sim 5.5 \times 10^{-4}$, at which the problem of backreaction might be avoided. The value of $\Lambda_{\rm min}$ lies within the range of Λ compatible with the BICEP2 results. However, the relatively short range of k presents a serious challenge to the viability of this model.

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