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DYNAMO EFFECTS IN MAGNETIZED IDEAL PLASMA COSMOLOGIES

KOSTAS KLEIDIS,*,† APOSTOLOS KUIROUKIDIS,*,‡
DEMETRIOS PAPADOPOULOS* and LOUKAS VLAHOS*

*Department of Physics, Aristotle University of Thessaloniki,
54124 Thessaloniki, Greece

†Department of Civil Engineering,
Technological Education Institute of Serres,
62124 Serres, Greece

and

‡Department of Informatics,
Technological Education Institute of Serres,
62124 Serres, Greece

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The excitation of cosmological perturbations in an anisotropic cosmological model and in the presence of a homogeneous magnetic field has been studied, using the ideal magneto-hydrodynamic (MHD) equations. In this case, the system of partial differential equations which governs the evolution of the magnetized cosmological perturbations can be solved analytically. Our results verify that fast-magnetosonic modes propagating normal to the magnetic field, are excited. But, what is most important, is that, at late times, the *magnetic-induction contrast* ($\delta B/B$) grows, resulting in the enhancement of the ambient magnetic field. This process can be particularly favored by condensations, formed within the plasma fluid due to gravitational instabilities.

Keywords: Cosmological perturbations; magnetic fields; dynamo mechanism.

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1. Introduction

Magnetic fields are known to have a widespread presence in our universe, being a common property of the intergalactic medium in galaxy clusters,[1] while, reports on Faraday rotation imply significant magnetic fields in condensations at high redshifts.[2] Large-scale magnetic fields and their potential implications for the formation and the evolution of the observed structures, have been the subject of continuous theoretical investigation in the past.[3–6] It became clear that if magnetism has a cosmological origin, it could have affected the evolution of the universe.[7] Today, there are several scenarios for the generation of primordial magnetic