Reflection of planewaves at the planar interface of two biisotropic media has been examined in order to obtain the Brewster wavenumber. This examination shows that the Brewster wavenumber is, at least, not necessarily affected by the reciprocity or the non-reciprocity of the media on either side of the planar interface.

1. The Brewster Wavenumber Concept

Roughly around the end of the Second World War, the mode of presenting the Brewster angle in textbooks underwent a drastic change. As has been cataloged in [1], the original definition as a polarizing angle was replaced by that of a zero-reflection angle. This new definition, being related to a pathological condition of a Fresnel coefficient for a vacuum/dielectric interface [2], is certainly the easier to remember, but represents just one among the many other interesting phenomena that can take place at such interfaces [3].
The original definition, given by Brewster himself, is far more exciting in that it can be profitably extended to other bimaterial interfaces. In this connection, the concept of a Brewster wavenumber has been put forth at Penn State during the past few years. It is the objective of this communication to shed further light on this concept.

Plane waves propagating towards (or away from) a planar interface between two homogenous regions can be expressed in terms of two distinct and orthogonal eigenmodes in either region [4]. Based on an extension of Brewster's empirical deductions, it has been conjectured that a condition may exist when the ratio of the amplitudes of the two eigenmodes of the reflected field is independent of the ratio of the amplitudes of the two eigenmodes of the incident field. This condition may be easily quantified in terms of the horizontal wavenumber $\kappa$ that comes in as a consequence of Snell's laws; a horizontal wavenumber fulfilling this condition may be termed as the Brewster wavenumber, its value depending, in general, on the frequency as well as on the properties of the two homogeneous media occupying either side of the planar interface. This conjecture has been tested for the planar interfaces of (i) a natural optically active [5] and an isotropic dielectric-magnetic media [6], (ii) a natural optically active and an uniaxial dielectric media [7], and (iii) an isotropic dielectric-magnetic and a general uniaxial media [8].

The cases examined heretofore [6-8] involved media that are reciprocal [9]. Of great interest, therefore, is the possible effect of nonreciprocity on the Brewster wavenumber concept. In order to explore this, we turn our attention to Fedorov biisotropic media [10, 11] that are the nonreciprocal generalizations of the isotropic natural optically active media [5, 12].

2. Fedorov Biisotropic Medium

A Fedorov biisotropic medium can be characterized by the frequency-dependent $\{\exp(-i\omega t)\}$ constitutive equations