

Quasi-static Waves on Resonant Elements in Non-chiral Periodic Media and Metamaterials: a Historical Survey

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Due to the interest in filters and in slow-wave-structures for microwave tubes several researchers derived dispersion characteristics and discussed their applications both for one-dimensional and two-dimensional cases. The existence of both forward and backward waves were shown, and the relationship between phase and group velocities were examined. This early work done in the 50s and 60s by Mourier [1], Atabekov [2] and Silin [3] will be discussed followed by plasma waves on nanoparticles as presented by Quinton et al. [4], Brongersma et al. [5], and Weber and Ford [6]. Similar waves were shown to be able to propagate along loaded, electrically coupled metallic rods (called electric dipoles in this context) [7], or along a set of magnetically coupled loops [8,9]. Due to their origin these latter waves were called magnetoinductive waves. These additional waves may be excited by an incident electromagnetic wave but they are not dependent on them. They have a separate existence. The similarities and differences between the various waves will be stressed and possible applications [9–13] including near field imaging and near field manipulation such as waveguiding or focusing will be discussed.

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