for the MSSW as v_0 becomes greater than v_p. The energy from the semiconductor is received—wholly ($Q_3 = 0$) or partly ($Q_3 < |Q_2|$)—by the MSSW and, consequently, the amplitude of the waves becomes larger. But if YIG damping is so great that $Q_3 > |Q_2|$, the radiated energy is all dissipated in YIG loss and does not contribute to the amplification.

IV. Conclusion

In the preceding section, the amplifying characteristics of the MSSW WW mode caused by a carrier flow in semiconductor have been investigated by using the dispersion equation and the energy conservation law for almost transparent media. It is pointed out that the WW mode is favorable to amplification, since it has a backward branch interacting with a slower drifting carrier. One of the important results of our energy analysis is that the MSSW instability occurs only when the energy dissipation of the media is negative for the waves. If this result is combined with Schlömann's microscopic and qualitative work [15], one may easily appreciate the amplifying mechanism of this type physically and construct a total picture of the system.

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On Microwave-Induced Hearing Sensation

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***Abstract*—When a human subject is exposed to pulsed microwave radiation, an audible sound occurs which appears to originate from within or immediately behind the head. Laboratory studies have also indicated that evoked auditory activities may be recorded from cats, chinchillas, and guinea pigs. Using a spherical model of the head, this paper analyzes a process by which microwave energy may cause the observed effect. The problem is formulated in terms of thermoelasticity theory in which the absorbed microwave energy represents the volume heat source which depends on both space and time. The inhomogeneous thermoelastic motion equation is solved for the acoustic wave parameters under stress-free surface conditions using boundary value technique and Duhamel's theorem. Numerical results show that the predicted frequencies of vibration and threshold pressure amplitude agree reasonably well with experimental findings.**

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I. Introduction

It HAS BEEN demonstrated that sound can be generated in laboratory animals by the absorption of microwave energy in the head [1]–[3]. These reports indicate that auditory activities may be evoked by irradiating the heads of cats, chinchillas, and guinea pigs with pulsed microwave energy [1], [4]–[6]. Responses elicited in cats by both conventional acoustic stimuli and by pulsed microwaves disappear following destruction of the round window of the cochlea [4], and following death [3]. This suggests that microwave-induced audition is transduced by a mechanism similar to that responsible for conventional acoustic reception, and that the primary site of interaction resides peripherally with respect to the cochlea. More recently [6], sonic oscillations at 50 kHz have been recorded from the round window of guinea pigs during irradiation by pulsed