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Chaotic Backward Volume Spin Waves A. HAGERSTROM, W. TONG, M. WU, Colorado State University, B. KALINIKOS, St. Petersburg Electrotechnical University, R. EYKHOLT, Colorado State University — Chaotic backward volume spin waves, excited by three-wave interactions, have been investigated. The waves were produced in an yttrium-iron-garnet film in an active feedback ring. Previous experiments have focused on the three-wave interaction of surface waves and backward volume waves produced in a similar system. In contrast to the previous work, this experiment focused on the detailed study of the three-wave processes of backward volume spin waves only. Measurements on the three-wave process threshold were first carried out for different magnetic fields and frequencies. After that, measurements were made for a set of ring gain levels in order to study the development of chaotic behavior in the feedback ring in a systematic way. Time profiles and frequency spectra of the generated signals were recorded. It was observed that in the formation of the chaotic signals, the ring eigen-modes played an important role. It was these modes that were becoming parametrically unstable against three-wave decay processes as the ring gain increased. Chaotic behavior existed over a range of ring gain levels. With a ring gain between 1.5 and 3 dB, it was possible to calculate the correlation dimension of the chaotic signal. As the ring gain increased from 1.5 dB to 3 dB, the correlation dimension increased from 4.7 to 12.5. This experiment demonstrates a new approach to construct a microwave chaotic oscillator as well as a possible microwave power limiter.

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