Abstracts

Application of Stimulated Electromagnetic Shock Radiation to the Generation of Intense Submillimeter Waves

S. Schneider and R. Spitzer. "Application of Stimulated Electromagnetic Shock Radiation to the Generation of Intense Submillimeter Waves." 1977 Transactions on Microwave Theory and Techniques 25.6 (Jun. 1977 [T-MTT] (Special Issue on the Proceedings of the Second International Conference on Submillimeter Waves and Their Applications)): 551-555.

A new synergistic effect, resulting in tunable high-frequency high-power narrow-band radiation, is described. The effect, called stimulated electromagnetic shock radiation (SESR), combines the Doppler shift in frequency of Compton backscattering of electromagnetic radiation from moving electrons with the formation of an electromagnetic shock front in a medium in which the Mach condition is satisfied. The underlying physical mechanism of SESR is contrasted with those of Cerenkov radiation and laser action. The characteristics of SESR and Cerenkov radiation are compared. It is found that SESR is tunable in frequency and can be generated with much greater intensity and in a much narrower frequency band than Cerenkov radiation. The efficiency of conversion of electron energy into SESR is expected to be high (greater than 50 percent) under suitable conditions wherein the process is made self-limiting. The potential of SESR for generating submillimeter and far-infrared waves is discussed qualitatively.

❑ Return to main document.