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Two methods to experimentally determine the extinction cross section for a large bandwidth in the microwave region are investigated in this paper. The motivation to measure the extinction cross section, *i.e.*, the sum of the total scattering cross section and the absorption cross section, comes from the need to verify recent theoretical results that bound the scattering from objects.

Through the optical theorem it is possible to calculate the extinction cross section from a measurement of the forward radar cross section (RCS). However, the direct measurement of the forward RCS in free space is experimentally difficult since the largest part of the received field at the receiving antenna consists of direct illumination by the transmitting antenna. The direct illumination contributes with a dominating background that has to be removed, with signal processing or otherwise, from the scattered field component that one wants to determine.

We have developed and validated a method to determine the extinction cross section for thin and non-magnetic planar objects. The method is based on a regular measurement of the monostatic RCS. The result shows that monostatic RCS measurements can be used with good accuracy to determine the extinction cross section for this type of thin samples.

The first method is compared to a more general measurement method based on a measurement of the RCS in the forward direction.

Examples will be given from measurements on fabricated samples of single-layer planar arrays of split ring resonators (SRR) or capacitive resonators. These designed materials are commonly described as metamaterials in the literature.