Maxwell's equations in presence of a conical tip of a negative material

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In this work, we are interested in the study of the time harmonic Maxwell equations in the presence of a conical tip of a material with negative permittivity ε and/or negative permeability μ. When these constants belong to some critical range, the electromagnetic field exhibits strongly oscillating singularities at the tip which have infinite energy. Consequently Maxwell's equations are not well-posed in the classical L^2-framework. The goal of the talk is to provide an appropriate functional setting for 3D Maxwell's equations when the dielectric permittivity and/or the magnetic permeability take/takes critical values. Following what has been done for the 3D scalar case, the idea is to work in weighted Sobolev spaces, adding to the space the so-called outgoing propagating singularities. The analysis requires new results of scalar and vector potential representations of singular fields. The outgoing behaviour is selected by combing the Mandelstam radiation principle and the limiting absorption principle.