

Focusing Using Single-negative Medium

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A thin slab of single negative material, such as a silver slab, is known as the poorman's version of the perfect lens proposed by Pendry. It can also act as a super lens in the sense that it can break the classical diffraction limit for the TM wave in the near field. In this work, we analyze the condition for image formation for a thin (nanoscale) slab and show that there exists quantized conditions for the optical path in order for a slab to behave like a lens, and both the silver (single negative) thin slab and the perfect (double negative) lens become special cases of such condition. This quantization serves to be an extension of the focusing criteria. Moreover, by employing an additional resonance configuration, high transmittance of light can be induced and the lens functions like the perfect lens, and yet it is much simpler in structure. This improvement follows directly from the established quantization rule.