Martin, Girard, and Dereux Reply: The sentence of our Letter [1] that García and Nieto-Vesperinas take out of its context [2] appeared in the discussion of Fig. 1, where we presented the amplitude of the total scattered field. Therefore, by *field*, we were referring to *total field amplitude*, as is clear from the context of our Letter and the caption of Fig. 1.

The remark (ii) made by García and Nieto-Vesperinas shows that, for subwavelength scatterers of low symmetry, a self-consistent vectorial three-dimensional calculation such as that in Ref. [1] provides more insight into the scattered near-field than a two-dimensional scalar perturbative calculation (Refs. [7,8] in [2]). Indeed, the total field amplitude does not simply "resemble" [2] the object, but can reproduce its shape or parts of its outline, depending on the incident polarization [3,4].

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Comment on "Generalized Field Propagator for Electromagnetic Scattering and Light Confinement"

In a recent Letter, Martin, Girard, and Dereux [1] make a theoretical study of the scattering of electromagnetic waves by 3D structures of arbitrary dielectric constant. In that work they present results for both TE and TM illumination, and reach the following conclusions (statement in p. 529, second paragraph): (i) "Contrary to the near field, the field at larger distances depends on the propagation direction of the incident field for both polarizations." In other words, the near field does not depend on the incident field, but the far field does; and (ii) for a dielectric object ($\epsilon = 2.25$) immersed in vacuum, with thickness and lateral size 0.06λ and 0.01λ, respectively, the near field scattered amplitudes for TE and TM polarization are different from each other. While for TM polarization the near field maps the object, independently of the direction of propagation of the incident wave [see point (i)], for TE polarization this is not the case.

The result (i) is incorrect as it would involve a propagator that does not satisfy the wave equation, and, hence, neither its basic uniqueness theorems. The reason is that the scattered field undergoes free propagation in the space from the near field zone up to the radiation or far zone. Therefore, it satisfies the homogeneous Helmholtz equation in that space. Now, it is well known that the field on a plane (or, in general, on any surface) of its free propagation domain uniquely determines the field throughout its whole space of propagation. This has several ways of being stated. Specifically, the following theorems exist.

(1) The solution of the Helmholtz equation in a domain D is an analytic function in D [2].

(2) The field at any finite domain of the space outside the source volume determines the field uniquely everywhere outside this volume [2].

(3) The field generated by a source distribution or scatterer that occupies a finite volume V, and whose source distribution function is continuous in V, contains necessarily both homogeneous and evanescent components outside V, unless this field vanishes everywhere outside V. In addition, this field cannot vanish in any finite domain of points outside V unless it vanishes everywhere outside V [3–6].

Of course, the statements of these three theorems are equivalent since, evidently, if there were two equal scattered near fields, each of which were produced by a different incident field, then the field resulting from substracting them would be a zero near field, and, hence, according to (3) this field would be zero everywhere, and, in particular, in the radiation or far zone region. Hence, the result (i) does not hold.

Neither is the result (ii) right because, in general, the scattered near field does not map the object surface, and it changes with the angle of incidence both for TE and for TM polarization. In fact, inverse scattering methods have to be developed to recover the object [7–9]. However, in the case of very small objects with a dielectric constant of 2.25, like in Ref. [1], it is well known (see, e.g., [9]) that perturbation theory is valid. Then the near field amplitude resembles the object, not only for TM waves as claimed in [1], but both for TE and TM polarizations.

Finally, we would like to mention that from the experimental point of view, the calculation of Ref. [1] is rather unrealistic. How can one measure the near field intensity from an object levitating in vacuum with dimensions of 40 nm by 7.5 nm?

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