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Seeing small things using superoscillations: mathematical exploration of a possible scheme

Any object, described by a target function that need not be band-limited, can be sampled at any chosen set of points and then propagated without evanescent waves, so as to be imaged exactly (i.e. nonparaxially) at multiples of a given repetition distance. If the samples span a sub-wavelength region, the repeated images are superoscillatory. Asymptotics enables an almost-explicit description of the superoscillations. But the matrix involved is ill-conditioned (many of its eigenvalues are very small), especially in the singular limit of extreme superoscillations. Thus this method of sub-wavelength imaging would be pathologically sensitive to noise, and the depth of focus is exponentially small.