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Effective Non-Localities of Nano-Layered Meta-Materials JUSTIN
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DINOV, IVAN AVRUTSKY, Wayne State University — Multi-layered nano-
composites have been suggested for negative index of refraction systems, photonic
funnels, super- and hyper-lenses, as well as other nanophotonic structures. We ana-
lyze the electromagnetic modes in such systems and show that they are not described
by conventional effective-medium theories. We demonstrate the response of a major-
ity of realistic layered structures is strongly affected by effective non-localities. We
develop the analytical description of the relevant phenomena and confirm our results
with rigorous numerical solutions of the Maxwell equations. Finally, we demonstrate
that multi-layered plasmonic nanostructures support high-index volume modes con-
fined to deep subwavelength areas by using the formalism we have developed.

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