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Theory of Plasmonic Waves on a Chain of Metallic Nanoparticles in a Liquid Crystalline Host[1] DAVID STROUD, NICHOLAS PIKE, The Ohio State University — Linearly polarized plasmonic waves can propagate along a chain of metallic particles, of sufficiently small diameter and spacing. We have calculated the dispersion relations for these plasmonic waves when the host is either a nematic or a cholesteric liquid crystal (NLC or CLC). An NLC is found to alter the dispersion relations of both transverse (T) and or longitudinal (L) waves significantly from those for an isotropic host. If the NLC director is perpendicular to the metallic chain, the doubly degenerate T branch is split into two linearly polarized branches. Similar results are obtained for a CLC with twist axis parallel to the chain, except that the T branches are elliptically polarized. When a magnetic field is applied parallel to the chain, the dispersion relations for the T branches are no longer symmetric about $k = 0$ and the chain may act as a one-way waveguide at certain frequencies. We present numerical examples assuming spherical metal particle with a Drude dielectric function.

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