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Colloidal Transport and Periodic Stick-Slip Motion in Cholesteric Finger Textures KUI CHEN, LINNEA METCALF, DANIEL H. REICH, ROBERT L. LEHENY, Department of Physics and Astronomy, Johns Hopkins University — We have investigated the transport of colloidal particles within cholesteric finger textures formed by mixtures of the nematic liquid crystal 4-cyano-4'-pentylbiphenyl (5CB) and the chiral dopant4-(2-methylbutyl)-4-cyanobiphenyl (CB15) with cholesteric pitches between 24 and 55 micrometers. Spherical silica colloids (radius 5-10 micrometers) moving under the force of gravity through the texture translated strictly perpendicular to the cholesteric axis and had no measurable mobility parallel to the axis. Thus, when the applied force was oriented at an oblique angle to the axis, the spheres moved at an angle to the force. Nickel disks, 20 micrometers in radius and 300 nanometers thick, driven by gravity similarly showed no mobility parallel to the cholesteric axis for small pitch. For larger pitch, the disks displayed a periodic stick-slip motion caused by elastic retardation followed by yielding of the finger texture. Effective drag viscosities obtained from the sphere and disk motion were anomalously large compared with those of pure 5CB.

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