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Magnetic Domain Wall Motion as a Basis for a New Type of Sensor. SEONG-JAE LEE, YEVGEN MELIKHOV, Center for NDE, Iowa State University, Ames, Iowa 50011, USA, CHOON-MAHN PARK, Dept. of Physics, Seonam University,Namwon 590-711, Korea, HANS HAUSER, Institute of Sesnor and Actuator Systems, Vienna Univ. of Technology, A-1040 Vienna, Austria, DAVID JILES, Wolfson Centre for Magnetics, Cardiff University, Cardiff CF24 3AA, United Kingdom — It has been found that the periodic motion of a magnetic domain wall under the action of a magnetic field can be used as a basis for linear and angular displacement sensor. The domain wall between two opposite domains is created by the field from two opposite permanent magnets and the periodic motion is excited by an external ac current. When the up-domain covers both the incident and reflected laser beam paths, the Faraday rotation reaches a positive maximum and when the down-domain covers both beams, the Faraday rotation reaches a negative maximum. If when the domain wall is between the incident and reflected laser beams, the Faraday rotation cancels and a reference or nominal "zero" rotation occurs. The sensor system consists of a laser, magneto-optic film, magnets, and a detector. By observation of the pattern of detected light intensity as a result of periodic movements of magnetic domain wall, we can extract information about linear or angular displacement a surface with resolution down to 3 μm or 0.01 deg, respectively.

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