Static and dynamic properties of patterned magnetic permalloy films

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Static magnetic and spin-wave properties of square lattices of permalloy micron dots with thicknesses of 500 Å and 1000 Å and with varying dot separations have been investigated. The spin-wave frequencies can be well described taking into account the demagnetization factor of each single dot. A magnetic fourfold anisotropy was found for the lattice with dot diameters of 1 μm and a dot separation of 0.1 μm. The anisotropy is attributed to an anisotropic dipole-dipole interaction between magnetically unsaturated parts of the dots. The anisotropy strength (order of 10^5 erg/cm^3) decreases with increasing in-plane applied magnetic field.