A topology optimized switchable permanent magnet system

The design of a magnetic field source that can switch from a high field to a low field configuration by rotation by 90° of a set of iron pieces is investigated using topology optimization. A Halbach cylinder is considered as the magnetic field source and iron inserts are placed in the air gap of the Halbach cylinder. The ideal shape of these iron inserts is determined as function of the field generated by the Halbach cylinder and as function of the size of the iron segments. The topology optimized structures are parabolic shaped pieces and have a difference in flux density between the high and low positions that is on average 1.29 times higher than optimized regular pole pieces. The maximum increase is a factor of 2.08 times higher than the regular pole pieces.

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