

ABSTRACT

A Halbach magnetic array is disclosed, including a plurality of first and second magnetic units alternately arranged in a width direction, wherein: each first magnetic unit includes first magnetic groups and first magnetic columns alternately arranged in a length direction, each first magnetic group includes four first magnetic bars arranged in a 2*2 matrix; each second magnetic unit includes second magnetic groups and second magnetic columns alternately arranged in the length direction, each second magnetic group includes four second magnetic bars arranged in a 2*2 matrix; each first magnetic column is magnetized in a height direction, and each second magnetic column is magnetized in a direction opposite to the height direction. A magnetic suspension vibration damper is also disclosed which includes Halbach magnetic arrays as described above that are stacked together along a height direction to produce a magnetic force in the height direction and performs the vibration damping function by means of magnetic attractive forces or magnetic repulsive forces. As a Halbach array has a magnetic density on one side that is $\sqrt{2}$ times of a traditional N-S array, the damper can achieve a higher load-bearing capacity at the same magnetic energy product and produce a magnetic field on one side with characteristics allowing optimized utilization of magnetic energy product. In addition, the damper can also significantly alleviate the issue of magnetic leakage associated with the use of N-S arrays.