

Claims

1. A system for generating a linear movement, comprising an electromagnetically charged body (30,MM) free to move along a main direction, at least one static field generator (50,Bob), and at least two buffer elements (20,40; RM,RM; ML,ML; MA,MA; MF,MF), wherein the movement of said electromagnetically charged body (30,MM) along said main direction is controlled by the static field generator (50,Bob) and by the buffer elements (20,40; RM,RM; ML,ML; MA,MA; MF,MF), and wherein said static field generator (50,Bob) is alternately powered with a power profile such as to generate the displacement of the system in either orientation along said main direction and wherein the system is supplied with a bias which has a frequency Ω that can be obtained by means of the following formula:

$$\Omega = A \cdot f(N)$$

- 15 with $A \in \mathbb{N}$ $1 \leq A \leq 5$
with $N \in \mathbb{N}$ $1 \leq N \leq 100$

$$f(N) = \begin{cases} f^1(N) & \text{se } N = 2k + 1 \\ f^2(N) & \text{se } N = 2k \end{cases}$$

with $k \in \mathbb{Z}$

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$$f^1(N) = \left\{ (\sqrt{2} \cdot N) + (V_c \cdot 10^{-1}) + \left[0,005 \cdot \left(1 + \left\lfloor \frac{N}{2} \right\rfloor \right) \right] \right\} \pm g^1(n)$$

$$f^2(N) = \left\{ (\sqrt{2} \cdot N) + (V_c \cdot 10^{-1}) - \left[0,004 \cdot \left(1 + \frac{N}{2} \right) \right] \right\} \pm g^2(n)$$

with $V_c = \text{costante di Viswanath} \cong 1,13198824$

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$$g^1(n) = \frac{n}{2} \cdot f^1(N) \cdot 10^{-2}$$

with $g^2(n) = \frac{n}{2} \cdot f^2(N) \cdot 10^{-2} n \in \mathbb{N} \quad 0 \leq n \leq 30.$

2. A system for generating a linear movement according to claim 1, wherein said electromagnetically charged body is a movable magnet (MM), which slides inside a hollow tube (T) closed at its two ends (A,B), said two buffer elements are mechanical bumpers (RM,RM) made of an elastic material and positioned at the two ends (A,B) of the tube (T), and said static field generator is a coil (Bob), which further acts as fixed magnet (MF).

3. A system for generating a linear movement according to claim 1,

wherein said electromagnetically charged body is a movable magnet (MM), which slides inside a hollow tube (T) closed at its two ends (A,B), said two buffer elements are springs (MI,MI) positioned at the two ends (A,B) of the tube (T), and said static field generator is a coil (Bob), which further acts as fixed magnet (MF).

5 **4.** A system for generating a linear movement according to claim 1, wherein said electromagnetically charged body is a movable magnet (MM), which slides inside a hollow tube (T) closed at its two ends (A,B), said two buffer elements comprise a system of springs (MA,MA) positioned at two ends (A,B) of the tube (T) which hold said movable magnet (MM) in the position of equilibrium,
10 and said static field generator is a coil (Bob), which further acts as fixed magnet (MF).

5. A system for generating a linear movement according to claim 1, wherein said electromagnetically charged body is a movable magnet (MM), which slides inside a hollow tube (T) closed at its two ends (A,B), said two buffer
15 elements are two fixed magnets (MF,MF) positioned at the two ends (A,B) of the tube (T), wherein said two fixed magnets (MF,MF) are positioned so as to hold said movable magnet (MM) in the position of equilibrium, and said static field generator is a coil (Bob), which further acts as fixed magnet (MF).

6. A system for generating a linear movement according to claim 1,
20 wherein said electromagnetically charged body is a movable magnet (MM), which slides on a central pin (PC), said two buffer elements are two fixed magnets (MF,MF) positioned at the two ends (A,B) central pin (PC), wherein said two fixed magnets (MF,MF) are positioned so as to hold said movable magnet (MM) in the position of equilibrium, and said static field generator is a coil (Bob), which further
25 acts as fixed magnet (MF).

7. A system for generating a linear movement according to one or more of the preceding claims, wherein said static field generator (50,Bob) comprises a plurality of coils (Bob1, Bob2,... BobN) powered separately, which further acts as fixed magnet (MF).

30 **8.** A system for generating a linear movement according to one or more of the preceding claims, wherein said static field generator (50,Bob) comprises a plurality of coils (Bob1, Bob2,... BobN) powered together, which further act as fixed

magnet (MF).

9. A system for generating a linear movement according to one or more of the preceding claims, wherein said static field generator (50,Bob) is powered with square-wave or sinusoidal or sawtooth power profile.

5 10. A system for generating a linear movement according to one or more of the preceding claims, wherein a diamagnetic cover (CD) is present which works as a "magnetic brake" to decelerate the movement of the electromagnetically charged body (30,MM) during the step of returning to the position of equilibrium.

10 11. A system for generating a linear movement according to one or more of the preceding claims, wherein a central tube (TC) made of diamagnetic material is present, which works as a "magnetic brake" to decelerate the movement of the electromagnetically charged body (30,MM) during the step of returning to the position of equilibrium.