Abstract: Linear compressor comprising a resonant linear motor (4) having a stator (9) and a linear displacer (3), the linear motor (4) cooperating with a resonant spring (2) that is driven by the linear displacer (3) at one of the ends of the resonant spring (2) with the opposite end of the resonant spring (2) cooperating with a mechanical actuation element (1). A variation sensor of magnetic flux (5) cooperates with the resonant spring (2). Said variation sensor of magnetic flux (5) comprising a fixed part (7) and a movable part (6), the movable part (6) coupled to the end of the resonant spring (2) opposite to the end cooperating with the linear displacer (3). The variation sensor of magnetic flux (5) is the sole means required to determine the displacement amplitude and the frequency of oscillation of the displacer (3) of the linear motor (4). Corresponding method for controlling the stroke in such a linear compressor.
Date of publication of the amended claims: 4 April 2013
AMENDED CLAIMS
received by the International Bureau on 08 February 2013 (08.02.2013)

CLAIMS

1. System of control of stroke and operation at resonant frequency of a reciprocating compressor having a linear motor (4) comprising a stator (9) and a displacer (3), the motor (4) cooperating with a resonant spring (2) that is driven by the linear displacer (3) at one of the ends of the resonant spring with the opposite end of the resonant spring cooperating with mechanical actuation element (1), CHARACTERIZED in that said system comprises:

   a magnetic flux variation sensor (5) cooperating with the resonant spring (2)

   and said variation sensor of magnetic flux (5) comprised by a fixed part and a movable part,

   the movable portion coupled to the end of the resonant spring (2) opposite to the end of the resonant spring cooperating with the linear displacer (3),

   wherein the magnetic flux variation sensor (5) is the sole means required to determine the displacement amplitude and the frequency of oscillation of a displacer (3) of linear motor (4).

2. System according to claim 1, CHARACTERIZED in that the variation sensor of magnetic flux (5) comprises a coil (7) supported by a support base (14) and a magnet (6) cooperating with the coil (7), wherein said magnet (6) generates a voltage induced in the coil (7).

3. System according to claims 1 and 2, CHARACTERIZED in that the movable part of the variation sensor of magnetic flux (5) comprises a magnet (6) integral to one end of a rod (13) whose opposite end is fixed to a fastening means (12) which connects the resonance spring (2) to the mechanical actuation element (1).

4. System according to claims 1 and 2, CHARACTERIZED by performing control of the stroke of the mechanical actuation element (1) by using the signal of the variation sensor of magnetic flux (5) induced.

5. System according to any one of claims 1 to 4, CHARACTERIZED in that the mechanical actuation element (1) comprises a piston.

6. Method for control of stroke and operation in the resonant frequency of a resonant linear motor, said linear motor (4) comprising a stator (9) and a linear displacer (3), the motor (4) cooperating with a spring resonant (2) that is driven by the linear displacer (3) at one of the ends of the resonant spring having the opposite end of the resonant spring cooperating with mechanical actuation element (1), CHARACTERIZED by comprising the performance of the following steps:
generating, by said linear displacer (3) of a force on the end of the resonance spring (2) with which the linear displacer (3) cooperates, so that when the resonant spring (2) has the end cooperating with the linear displacer (3) displaced in one direction, its opposite end moves in the opposite direction;

- receiving the signal from a variation sensor of magnetic flux (5) having its movable part coupled to the resonant spring (2) at the opposite end of the linear displacer (3);
- performing reading of the current of the linear motor (4);
- controlling the operation of mechanical resonance frequency f on the signal generated by the variation sensor of magnetic flux (5) and of the current signal of the linear motor (4);
- controlling the stroke of the linear actuator from the signal generated by the variation sensor of magnetic flux (5) and the current signal of the linear motor (4) simultaneously to the control of operation at frequency of mechanical resonance.

7. Control method according to claim 6, CHARACTERIZED in that it further comprises an evaluation of the delay between the signal of the variation sensor of magnetic flux (5) and the current signal of the linear motor (4).

8. Control method according to claims 6 and 7, CHARACTERIZED in that from the evaluation of the delay of the signals of the variation sensor of magnetic flux (5) and of the current of the linear motor (4) there is comprised the frequency variation of the current of the linear motor (5) until the signal of the variation change of magnetic flux (5) lie in phase with the signal of current of the linear motor (5).

9. Control method according to claim 8, CHARACTERIZED by comprising the variation in the driving frequency of the current of the linear motor (5) until the signals are delayed by 0 or 180 degrees, or close to these values.

10. Control method according to claims 6, 7 and 8, CHARACTERIZED in that/according to a law of adjustment, it feeds back information of the operating frequency to adjust the stroke information for various operating frequencies.

11. Control method according to claim 6, CHARACTERIZED by comprising the generation of a digital signal which is related to the phase displacement of electric phase between the signal of the variation sensor of magnetic flux (5) and the current signal of the linear motor (4).

12. Control method according to claim 6, CHARACTERIZED in that it comprise means for evaluating the displacement of electric phase between the signal
from a variation sensor of magnetic flux (5) and the current signal of the linear motor (4).