Introduction to The Perpetual Mechanics Theory and Future Directions

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Abstract. The perpetual point's definition applied in the dynamic analysis of mechanical systems leads that they can be associated with manifolds defining rigid body motions. Herein, through 4 examples the dynamics prescribed by a formalism developed around the perpetual manifolds is shown. The characteristics of the dynamic analysis, in terms of mechanics are examined. As a summary, for the first time the following are prescribed explicitly: particle-wave motion, zero internal forces, no energy loss, perpetual machines of third kind. Therefore, the developed formalism can be claimed that forms the basis of The Perpetual Mechanics Theory. Possible future research directions are discussed too.

Introduction

Perpetual points (PPs) in mathematics have been defined in [1] and their application in examining the dynamics of linear unforced mechanical systems (MS) leads that they are comprising manifolds defining rigid body motions [2]. Further, using the PPs definition the perpetual mechanical systems (PMSs) are defined as the unforced MS that admits perpetual manifolds of rigid body motions (RBMs). In [3] a theorem defines the correlation of the "external forces" (herein is used) applied to a PMS resulting RBMs and leads that the PMS can have free or embedded configuration. In Fig. (1a) these two configurations of PMS (4 in total) with the force's functions, are shown. The free PMSs (with index $i=f$) arise by setting zero the c_x and the k_x. One free PMS is nonlinear with $k=1\ N/m^3$ (index $j=NL$), and the other with zero k is having only linear internal forces ($j=L$). The two embedded PMSs ($i=e$) arise by setting $c_x=0.016\ N\cdot s/m$ and $k_x=1\ N/m$, for nonzero k ($j=NL$), and zero k ($j=L$). Using equal Initial Conditions (ICs) in numerical integrations lead to the displacements that Fig. 1b is depicting, whereas the PMSs on each configuration has the same RBM.

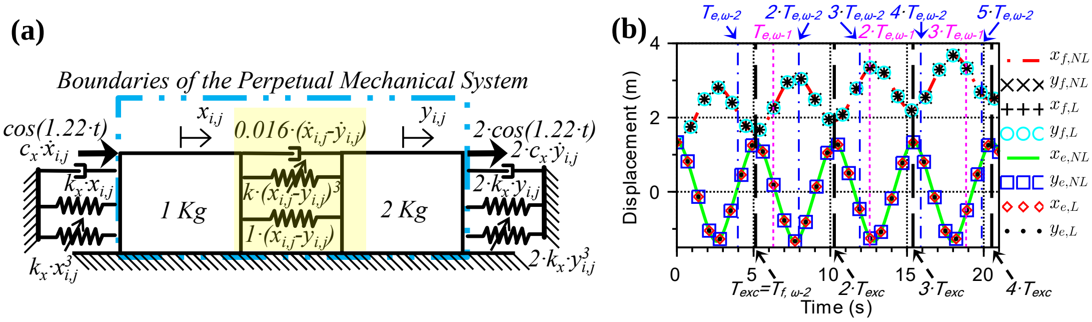

Figure 1: (a) The 4 configurations (different i,j) of the mechanical systems, with their associated forces. (b) The displacements of the 4 mechanical systems with the same to all masses ICs (1.3328999 m, 0.0560637 m/s).

Results and discussion

As a summary so far, with a specific mathematical method the displacements associated with RBM have been prescribed and shown. The examination Fig. 1 in terms of mechanics leads to certain conclusions: a) in Fig. (1b) the RBM of the embedded PMS ($x_{e,L}$, $x_{e,NL}$) is particle-standing wave motion, that has been designed using this formalism [4] (steady state with numerically defined IC.s), and of the free PMS ($x_{f,L}$, $x_{f,NL}$) is a particle-longitudinal wave motion [3]; b) the systems with linear internal forces and those with nonlinear internal forces have the same motion; c) in the yellow highlighted area of Fig. (1a), all the individual forces in RBM are zero [5], d) there is no internal degradation/energy storage, e) there is no internal energy loss [5], f) the PMS when earn energy behave as a perpetual machines of 3rd kind [5]. The a-f conclusions, explicitly prescribed through theorems and corollaries partially forming the formalism leading to new design [4], so arguably can be claimed that all the relevant articles e.g., [2-5] form the basis of 'The Perpetual Mechanics Theory'. Future research directions can be considered in Mathematics e.g., for other types of systems, in Physics e.g., about the 2nd Law of thermodynamics, and in Engineering e.g., for new designs.

References

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