Exploring Periodic Boundary Conditions: A Study on 2D and 3D Spheres and Continuum Limit

Alireza Same[1], Hanie Hatami[2], Mehrnaz Rabiee[3]

Abstract

Example abstract for the Annals of Physics journal. Here you provide a brief summary of the research and the results.

Keywords: keyword 1, keyword 2, keyword 3, keyword 4

1. Introduction

2. 1D Spheres Revisited

As it is done in many standard textbooks (see Georgi), the simple case of modeling a disturbance through a circular rod can be first modeled by considering two fundamental assumptions: Firstly, Interactions is only between neighboring particles. They cannot have a significant effect on far away neighbors, this property is what makes studying waves interesting. Secondly, the force between particles is approximately linear with respect to change of distance relative to their equilibrium distance. Although these two conditions make such great restrictions on the model that we are studying. It is rather accurate in the relatively accurate measurements made.

Consider a circle of radius R with N particles with same mass m evenly distributed on the circle. With the assumptions made we can consider N springs with spring constants k identical to each other. This system experiences a symmetry called *"Periodic Symmetry"*. As from rotation of $2\pi/N$ on either directions or reflections on either vertices we get the same system again. Our description should not make any distinction between these $2N$ cases. There is another free parameter in the Question which is the initial position of on of the particles. As this is not measurable due to need for setting a starting point on circle we have all the information to describe the system. Figure 1 shows the system for the special case $N = 4$.

We want to derive the general formula for the N particle case from this simplified case.

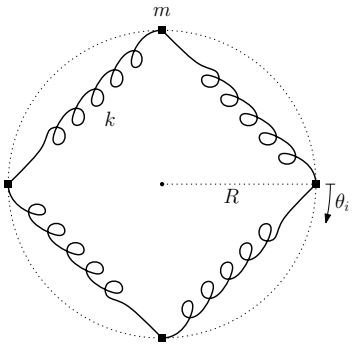

Figure 1: 4 identically distributed point masses on a circle

3. Discussion

4. Summary and conclusions

Acknowledgements

Thanks to ...

Email addresses: alirezasame@gmail.com (Alireza Same), alirezasame@gmail.com (Hanie Hatami), alirezasame@gmail.com (Mehrnaz Rabiee)

[1]99100709

[2]99100614

[3]99100669

References

Georgi, H., . The Physics of Waves.