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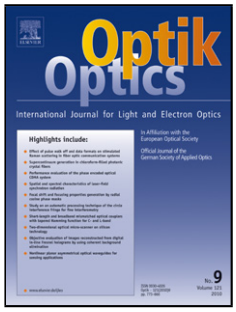

Title: Non-Doppler frequency shift of Newton waves in artificial materials

Author: Zhong-Yue Wang

PII: S0030-4026(18)31115-X
DOI: https://doi.org/10.1016/j.ijleo.2018.08.006
Reference: IJLEO 61303

To appear in:

Received date: 15-5-2018
Accepted date: 2-8-2018

Please cite this article as: Wang Z-Yue, Non-Doppler frequency shift of Newton waves in artificial materials, *Optik* (2018), https://doi.org/10.1016/j.ijleo.2018.08.006

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Non-Doppler frequency shift of Newton waves in artificial materials

Zhong-Yue Wang*

Engineering Department, BSC, Gongjiang Road, Shanghai 200435, China

*Corresponding author, E-mail: wangzhongyue_brown@126.com

Abstract: The Doppler effect has widely applications in physics, engineering and cosmology. It is verified in vacuum and other linear media such as air and water but the validity in complex materials is rarely tested. Now we propose a counter-example in the artificial material. There is an extra term proportional to the square of relative velocity u^2 for the Newtonian wave whose dispersion relation is $\omega \propto k^2$. Actually, the frequency shift depends on the dispersion relation and the universal expression does not exist.

Keywords: Doppler effect; Lorentz transformation; Newtonian; inertial mass; mass-energy equation

PACS: 78.67.Pt; 03.30.+p; 41.20.Jb; 11.30.Cp; 12.60.-i;

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