



Iranian Journal of Physics Research, Vol. 22, No. 4, 2023  
DOI: 10.47176/ijpr.22.4.61466

## Magnonic transport of an antiferromagnetic chain at the transfer matrix approach

S Shojaei<sup>1</sup>, M Mardaani<sup>1,2\*</sup> and H Rabani<sup>1,2</sup>

1. Department of Physics, Faculty of Sciences Shahrekord University, Shahrekord, Iran
2. Nanotechnology Research Center, Shahrekord University, Shahrekord, Iran

E-mail: mohammad-m@sku.ac.ir

(Received 12 June 2022 ; in final form 13 August 2022)

### Abstract

In this paper, we study the magnonic transport properties of an antiferromagnetic chain that is connected to two semi-infinite ferromagnetic leads by using the transfer matrix approach. The antiferromagnetic chain is assumed to be located in a magnonic dissipative environment when an external magnetic field is applied to it. We improved the model in a way that the numerical calculations are rapidly done. In the following, we perform the numerical calculations to obtain the magnonic transmission coefficient and density of states of a multi-atomic antiferromagnetic chain as an illustrative example and we present its results in detail, in the presence of magnetic field and magnonic dissipative forces. Controlling of the resonance region width and the number of peaks in magnonic conductance spectra by variation of the magnetic field amount, the length of the chain, and the magnetic parameters of the system are discussed.

**Keywords:** transfer matrix, antiferromagnetic, magnonic transmission coefficient

For full article, refer to the Persian section