

## **Exact solution of the antiferromagnetic sawtooth chain with Ising and Heisenberg bonds**

V. Ohanyan<sup>a,b</sup>

<sup>a</sup>*Department of Theoretical Physics, Yerevan State University, 1 Alex Manoogian Str., 0025 Yerevan, Armenia*

<sup>b</sup>*Yerevan Physics Institute, 2 Alikhanian Brothers, 0036 Yerevan Armenia, E-mail: ohanyan@yerphi.am*

The sawtooth chain with pairs of  $S = 1/2$  spins interacting with  $XXZ$ -interactions placed on each second tooth is considered. All other interaction bonds are taken to be of Ising type. Exact statistical mechanical solution of the model within the direct transfer-matrix technique is obtained. The solution allows one to obtain exact analytic expressions for all thermodynamic functions of the model. The ground state phase diagram and plots of magnetization versus external magnetic field are obtained. In contrast to the case of conventional Heisenberg sawtooth chain with all antiferromagnetic couplings the system under consideration exhibits magnetization plateau not only at  $M/M_{sat} = 1/2$  but at  $M/M_{sat} = 1/4$  as well for certain region of parameters.