

**ABSTRACT****THE STUDY OF MAGNETIC PROPERTIES OF THE BILAYER ISING MODEL IN AN EXTERNAL MAGNETIC FIELD**

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In this study, we study magnetic properties of a ferromagnetic bilayer Ising system consisting of two monolayers ( $A$  and  $B$ ) with different spins ( $\sigma_A = 1/2$  and  $S_B = 1/2, 1$ ) and different interaction constants coupled together with an interlayer interaction by using the lowest approximation of the cluster variation method. The thermal variations of the layer and total magnetizations are investigated extensively and obtained only second order phase transition in the case of  $\sigma_A = 1/2$  and  $S_B = 1/2$ . On the other hand, both the first and second order phase transitions are observed for the spin values  $\sigma_A = 1/2$  and  $S_B = 1$  on the monolayers. The effect of single-ion anisotropy on the only  $B$  monolayer is also studied. The phase transitions of monolayer magnetizations are studied and the phase diagrams of the system are given in different planes. The temperatures dependence of the total magnetization and the influence of the external magnetic field on the all system is also examined. We find interesting magnetic properties in the system, such as tricritical point and compensation behavior, depending on the competition between the interlayer interaction and single-ion anisotropy parameter.

**2010, 57 pages****Key Words:** Bilayer Ising model; Cluster variation method; Magnetic properties; Phase transitions and phase diagrams