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Thermodynamic states of the mixed spin 1/2 and spin 1 hexagonal nanotube system obtained from a eighteen-site cluster within an improved mean field approximation

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Highlights

- From the Bogoliubov inequality the mean field approximation is applied.
- By the Gibbs free energy the critical lines of the first and the second order phase transitions are found.
- An unusual increase of the magnetization with the increase of the temperature is explained by the presence of an unstable state with order parameter nonzero.
- The extinction of the metastable with an unstable state are explained by Gibbs free energy and entropy values.
- The effect of the Blume-Capel spins in the Ising spins are observed in the first order phase transition.

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