ABSTRACT

The effect of antiferromagnetic order on superconducting order parameter (Δ) in multilayer cuprate superconductors has been studied by using double time retarded Green's function technique, and expression for Δ has been obtained. The expression is found to be depending on the antiferromagnetic order parameter (ϕ) along with temperature (T). It has been found that at low temperatures superconducting order parameter decreases linearly with increasing antiferromagnetic order parameter. But at the temperature close to transition temperature (T_C), this linearity violated and superconducting order first decreases suddenly and then there is gradual decrease with increasing antiferromagnetic order. This shows that at near to transition temperature the area of co-existence of antiferromagnetism and superconductivity decreases. Results also show that for cuprates having T_C below 35 k, antiferromagnetic order co-exist with superconductivity and could be helpful for superconductivity.

The magnetic properties of LnOFeAs system has also been studied using anisotropic Heisenberg model with three in-plane (J_1, J_2, J_3) and one out-of-plane ($J_\perp$) exchange interactions. Starting with stripe configuration with two interpenetrating sublattices such that the spins are always oppositely aligned in two sublattices, the expression for sublattice magnetization and Néel Temperature (T_N) has been obtained using Green's function technique within random phase approximation (RPA). Using the expression for Néel temperature, variation of T_N with $J_\perp$ has been studied. The effect of $J_\perp$ on the sublattice magnetization has been also studied. For realistic values of exchange coupling constants, Néel Temperature of LnFeAsO system (Ln = La, Pr & Ce) has been evaluated. The theoretical results are compared with experimental results and found in good agreement.