Finite hole-doping of the $t-J$ and related models within the non-crossing approximation SATYAKI KAR, MARTECH & Department of Physics, Florida State University, EFSTRATIOS MANOUSAKIS, MARTECH, Department of Physics, Florida State University & University of Athens — The spin and hole dynamics in a 2D hole-doped quantum antiferromagnet is studied for small but finite hole-doping fractions within the two-dimensional $t-J$ and the related $t - t' - t'' - J$ model. The non-crossing approximation is used to sum up the self-energy diagrams and the Dyson’s equations for both the hole and magnon Green’s functions are solved self-consistently. The evolution with doping of the hole and magnon spectra with doping is determined, the Fermi surface topology is studied and the doping-dependent staggered magnetization of the system is computed. The latter determines the doping fraction up to which the spin wave theory remains a reasonable approximation to describe the doped antiferromagnet.

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