An analytical and combinatoric approach of the XXX Heisenberg model for the two-magnon sector

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XXX Heisenberg s-1/2 model has been examined in detail during last decades, however, recently one may find some new insights into that issue. Among several approaches describing the eigenproblem for the finite case, a close look into the structure of Bethe equations (BE) for the two-magnon sector case seems to be particularly interesting. Bethe equations enable us to evaluate parameters labeling eigenstates of a magnet, however to find appropriate sets of winding numbers, which parametrize BE, one has to apply the famous TQ equation of Baxter, combined with the Inverse Bethe Ansatz method, or a combinatoric approach, with the use of rigged string configurations. The latter appears to be a tool which ensures the completeness of solutions, and, at the same time, combinatorial numbers enable to indicate precise winding numbers, so that one can obtain all parameters describing eigenfunctions.