The sl_2 Loop Algebra Symmetry of the XXZ-Type Spin Chain Associated with the Superintegrable Chiral Potts Model

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The sl_2 loop algebra $L(sl_2)$ symmetry is found in a sector of the XXZ-type spin chain at a root of unity whose transfer matrix commutes with that of the superintegrable chiral Potts model. The regular Bethe state which is an eigenstate of the spin chain is shown to be a highest weight vector of $L(sl_2)$. The highest weight representation space generated by the Bethe state gives a $L(sl_2)$-degenerate eigenspace of the spin chain. The Drinfeld polynomial which characterizes the $L(sl_2)$-degenerate eigenspace of the spin chain is calculated. The Drinfeld polynomial is equivalent to the superintegrable chiral Potts polynomial which characterizes a subspace with the Ising-like spectrum of the superintegrable chiral Potts model. (Joint work with Tetsuo Deguchi)