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Development of the excitonic state of bilayer quantum Hall system at total filling one DAIJIRO YOSHIOKA, The University of Tokyo, NAOKAZU SHIBATA, Tohoku University — Excitonic phase, namely Haplerin's $\Psi_{1,1,1}$ state, is realized in bilayer quantum Hall systems at $\nu = 1$ at small layer separation d as evidenced by various experiments. This phase vanishes as d is increased, and at large enough separation, composite-fermion Fermi-liquid states are realized in each layer. How the excitonic state develops into independent Fermi-liquid states has not been fully understood. We investigated this development by the density matrix renormalization group method (DMRG). We calculated the ground state wave function and energy gap for various values of d for systems with up to 24 electrons. From the ground state wave function, two-particle distribution function $g(r)$ and excitonic correlation function have been calculated. The results indicate that the transition between the two limits is continuous. There is a smooth crossover of the ground state at around $d/l \simeq 1.6$ from the excitonic character at small d/l to independent Fermi-liquid character at large d/l, where l is the magnetic length.

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