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Spectral function near the Mott transition in the one-dimensional Hubbard model MASANORI KOHNO, National Institute for Materials Science, Japan — Spectral properties near the Mott transition are investigated in the one-dimensional Hubbard model. The single-particle spectral function is calculated using the dynamical density-matrix renormalization group method, and the dominant modes are identified using the Bethe ansatz. Characteristic features near the Mott transition, such as the pseudogap, hole-pocket behavior, spectral-weight transfer, and upper Hubbard band, are explained in a unified manner in terms of spinons, holons, antiholons, and doublons. From the insulating side, the Mott transition is characterized by the emergence of a gapless mode whose dispersion relation extends up to the order of hopping (spin exchange) in the weak (strong) interaction regime caused by infinitesimal doping. From the metallic side, the transition is characterized as a loss of charge character from the mode having both spin and charge characters, while the spin excitation remains gapless and dispersing. These features cannot be explained in either the rigid-band picture or the Fermi liquid theory. I expect that generic features near Mott transitions can be deduced from the present results.

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