



# Spectral and Timing Studies of Cyg X-1 in the Low/Hard State with Suzaku

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From 2005 to 2009, 25 observations of Cyg X-1 were performed with Suzaku, achieving a total exposure of 446 ks. In all observations, the source was found in the low/hard state, while the 1.5--12.0 keV count rate of the All-Sky Monitor onboard RXTE varied by a factor of  $\sim 3$ . In each observation, the 10--60 keV HXD-PIN spectrum and the 60--400 keV HXD-GSO spectrum were fitted successfully by a thermal Comptonization model plus reflection by a thick neutral material. As the soft X-ray intensity increased, the Compton  $y$ -parameter was found to decrease from 1.0 to 0.6, while the solid angle of reflection to increase by  $\sim 30\%$ . Also conducted was timing analysis over a frequency range of 0.001--10 Hz. As the source became brighter in soft X-rays, the characteristic frequency of hard X-ray variation increased from 0.03 to 0.3 Hz, while the fractional hard X-ray variation integrated over 0.001--0.01 Hz decreased by a factor of  $\sim 5$ . The signals in the 60--200 keV band were generally found to vary on shorter time scales than those in the 10--60 keV band. These spectral and timing results can be consistently interpreted by presuming that increases in the mass accretion rate cause the Comptonizing hot corona to shrink, while the optically-thick disk to intrude deeper therein.

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