Time Dependent Accretion Disk Models of GRS 1915+105

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During the past few years, the galactic microquasar GRS 1915+105 has exhibited a bewildering diversity of large amplitude, chaotic variability in X-rays. We show that the fast rises and falls in the light curve of this source rule out an ADAF for this source. We argue that observations clearly require a quasi-stable accretion disk solution at high accretion rates. We have therefore devised a modified viscosity law which has a quasi-stable upper branch, and developed a code to solve the time-dependent equations for an accretion disk. The model does indeed account for several of the gross observational features of GRS 1915, including the overall cyclic behavior on time-scales of $\sim$ 100 - 1000 s, although a detailed comparison fails.

We then consider several effects as a possible explanation for the disagreement between the theory and the observations. A hot corona above the disk, a radius dependent α-parameter, and advection of energy into the hole do not appear to be promising in this respect. However, a more elaborate model with a corona and a jet is moderately successful in reproducing GRS 1915+105 behavior.