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A Model of Waveform Variations and Intermittency in Accretion-Powered Millisecond Pulsars[1] FREDERICK K. LAMB, STRATOS BOUTLOUKOS, ALEXANDER CLARE, DANIEL DORRIS, SANDOR VAN WASSENHOVE, WENFEI YU, U. Illinois, COLEMAN MILLER, U. Maryland — We suggest that the accretion-powered X-ray oscillations of most accreting millisecond pulsars (MSPs) are weak and nearly sinusoidal because they are aligned or nearly aligned rotators. The properties of the emitting region on the neutron star surface are determined by the geometry and strength of the star's magnetic field and where accreting plasma enters the magnetosphere. They are therefore expected to change with time as the character of the flow in the inner disk changes. X-ray emission and general relativistic ray-tracing computations show that if accretion-powered MSPs are nearly aligned, modest changes in the size and shape of the emitting region can explain the pulse waveform variations and large changes in apparent spin-frequency observed in many of them and the sudden appearance and disappearance of pulsations (intermittency) observed in some. This model can also explain why accretion-powered periodic oscillations have not been detected from many neutron stars in low-mass X-ray binary systems.

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