

Drifting subpulses and thermal X-ray emission from the polar cap surface

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Abstract

The phenomenon of subpulse drift is considered within the model of partially screened vacuum gap. We found that the intrinsic drift rate and polar cap heating rate are coupled to each other, since they are both determined by the same value of gap electric field. We derived a "clean-cut" formula relating the X-ray luminosity L_x from heated polar cap and subpulse drift periodicity \hat{P}_3 (polar cap carousel time). Based on several cases in which \hat{P}_3 is known it is argued that $L_x/\dot{E} \sim 10^{-3}$, where \dot{E} is the pulsar spin-down rate. This intriguing property was previously attributed to the pulsar magnetospheric emission. Here we suggest that it could also be a characteristic property of thermal emission from the spark heated polar cap.