



Magnetospheric period oscillations at Saturn: Evidence in magnetic field phase data for rotational modulation of Saturn kilometric radiation emissions

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Since its detection in Voyager data in 1980, the periodic modulation of Saturn kilometric radiation (SKR) near the ~ 11 h planetary period has been thought to be 'strobe-like', i.e. modulated with a phase that is independent of the position of the observer. Studies of related modulations in magnetospheric magnetic field and plasma data, on the other hand, have shown that these perturbations rotate around the planet with a period close to the SKR period. However, detailed analysis reveals the presence of variable slow secular drifts between the magnetic field and SKR modulation phases, initially indicative of slightly differing periods. Here we show, using a simple theoretical model, that these drifts can be accounted for if the SKR modulation phase also rotates around the planet, combined with a restricted view by the spacecraft of the SKR sources distributed around the auroral oval. Although the observed phase of the SKR modulations is then generally close to that of the dominant sources in the post-dawn sector, giving a 'strobe-like' effect, this is not perfectly so, leading to position-dependent SKR phase modulations that explain the secular phase drift relative to the field phase. Confirmatory evidence of this scenario is provided through the first independent determination of the rotation period of the magnetic field perturbations throughout the Cassini mission to date.