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Time Evolution of Pulsar Magnetosphere – An Implicit Approach
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— The Magnetosphere for a pulsar plays a very significant role in its evolution and is regarded as an ideal site for high energy emission. Understanding the structure, dynamics and evolution of the magnetosphere is important. Contopoulos et al. (CKF, 1999) were able to demonstrate numerically the importance of current sheets (CS) along with the Goldreich-Julian charge density (1969). In addition, Spitkovsky (2006) was also able to numerically solve the time dependent hyperbolic system of equations and validate the existence of CS within the Alfvén radius and beyond. However the *explicit* nature of the numerical approach restricts the size of the time step, which results in an unresolved current sheet. Currently the CKF type magnetosphere is the new benchmark in pulsar modelling and hence CS and its distribution plays a key role. Its contribution in pulsar spin down mechanism, high energy emissions, flux outflow, reconnection events, acceleration mechanisms and locations is currently not understood and as a result resolution of the CS is critical. It is with this motivation that our group has decided to develop a computationally challenging *implicit* code under the *force-free electrodynamics*. With *implicit* approach the Courant number can be sufficiently large which will not only help to resolve the CS and spatial resolution but will also guide us within the high conductivity limit of resistive solutions, where the traditional *explicit* method becomes too expensive.

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