Fluxon Dynamics in Stacked Josephson Junctions

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We use the Sakai-Bodin-Pedersen model – a system of perturbed sine-Gordon equations – to study numerically the dynamics of Josephson phases in stacks of inductively coupled long Josephson Junctions. The boundary conditions correspond to a stack of overlap geometry. In order to obtain appropriate initial values for the dynamic problem the corresponding static problem is solved as well. We are interested in solutions having one or two moving fluxons in each junction and seek for conditions under which a bunching of fluxons is possible. The current-voltage dependencies for different values of dissipation and coupling parameters for bunched and unbunched states are found. The regions of existence for these states with respect to the applied magnetic field and the external current are also calculated. To solve numerically the above problems Finite element method and Finite difference method are used.