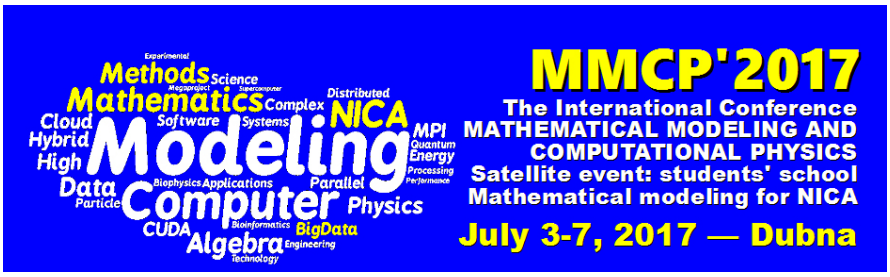

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Simulation of collective excitations in the stack of long Josephson junctions

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We consider the generalized model of the system of coupled long JJs[1] which takes into account the inductive and capacitive coupling and the diffusion current[2,3]. Numerical investigation of phase dynamics of long JJs stack is based on the parallel simulation algorithm which provides an essential acceleration of simulation procedure[4]. Using the developed numerical approach, we demonstrate a creation of charge travelling wave in the system of coupled LJJs. Another important result is related to the demonstration of the coexistence of the charge travelling wave with the standard fluxon mode. This fact indicates an appearance of a new unique collective excitation in the system of coupled Josephson junctions, namely, a composite state of the Josephson current, electric field, and vortex magnetic field. We have demonstrated the effect of this collective excitation on the power of the electromagnetic radiation from the stack of long JJs.
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