Current Spreading in Thin Foils or Flat Current Sheaths [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2023.50.2023.1.1.185

Garanin S.F., Kravets E.M.

FSUE RFNC-VNIIEF, Sarov, Nizhniy Novgorod region, Russia, SFGaranin@vniief.ru

To study the evolution of current distribution in non-uniform thin current sheaths or foils, we use an integro-differential equation, which reduces the three-dimensional magnetic field problem to two dimensions, and, for current distribution across the width of non-uniform current sheaths or foils, the two-dimensional magnetic field problem to one dimension.

For uniform current sheaths with constant conductivity, the scale of current distribution in space for the current, initially concentrated in a limited region, grows proportionally with time with a velocity of , where σ is the conductivity and Δ is the thickness of the sheath material.

We consider current distribution across the width of a foil in a periodic system of serpentine flat foils as applied to the problems of current transfer by electrically exploded opening switches. We demonstrate that current distribution in the foil in this system initially corresponds to the perfect conductivity of the foil. Then, on a time scale of  (2*s* is the foil width), the current distribution in the foil relaxes to uniform.

According to our estimates, in the foils used as opening switches, currents are expected to have time to get uniformly distributed across the foil width in the process of current transfer to the load, so the corrections for non-uniform current distribution in the opening switches must not be high.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Pt/ru/HE-Garanin.docx) [↑](#footnote-ref-1)