MODELLING OF MULTICATHODE FIELD EMISSION CONFIGURATIONS

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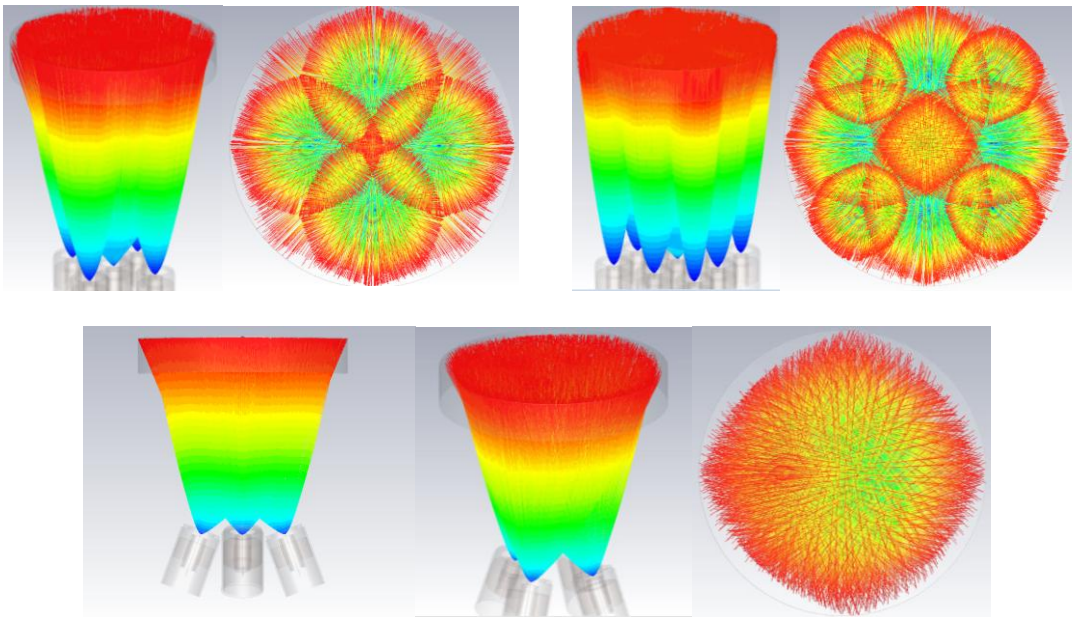
ABSTRACT

While designing high-power cathodoluminescent devices [1, 2], it is important to ensure high currents and homogeneous excitation of the phosphor-covered anode. The latter is important since it allows the phosphor to function in the most efficient excitation regimes when the current density nowhere exceeds the critical value. The simplest way to obtain high field-emission currents is to utilize in one device several cathodes that, e.g., involve carbon fibers [3]. For instance, 5 or 9 cathodes mounted in parallel (see the Figure, upper part) allow one to excite the entire anode. In this case the central cathode excites the entire anode, though the others excite it only partially. The degree of overlapping of the electron beams from various cathodes on the anode is not high, and the uniform irradiation is not obtained. The mutual influence of the cathodes is observed. It is of interest to determine configurations with maximal overlapping degree when each of the cathodes irradiates the entire or almost entire anode area. For example, if four cathodes are mounted at an optimal angle each of them irradiates approximately the entire anode (see the Figure, bottom par). The degree of overlapping is high. These configurations improve the reliability since when one of the cathodes fails the initial power can be maintained by increasing the currents of the remained cathodes.



References

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