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Activation of the explosive-emission cathode under various conditions of preinitiation

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Abstract. Low inertial transition of the field emission into explosive electrons emission at the cathode and related fast-rise-time electron beam formation are of interest in a phase-stable excitation of relativistic high-power microwave oscillators. We present experiments on the cathode activation using emission initiation during specially prepared advance voltage pulse (prepulse) possessing variable amplitude of tens-hundreds kilovolts and the width adjustable from tenths to units of nanosecond. Such a prepulse can be separated in time with a main accelerating pulse as well as adjoined to the fast-rise-time voltage front.

Keywords. Field emission, explosive electrons emission, cathode, high voltage, subnanosecond pulse.

1. Introduction

The research in this paper is determined by the recently presented approach [1] to the task of coherent power summation from high-power microwave (HPM) sources [2] when the microwave power flux density is increased as the square of the number of the in-phase radiators. In contrast to multichannel HPM amplifiers [3-5] where output signals are phase-locked to the input radio-frequency signal, we've demonstrated that

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