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Multi-scale modelling of electrical breakdown in vacuum: Influence of electromagnetic power

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Vacuum arcs –also known as breakdown–, i.e. electric discharges appearing in vacuum, are a major limiting factor for various applications such as particle accelerators, fusion reactors, vacuum interrupters, X-ray sources, and space applications. However, the physical mechanisms underlying the very initiation of the phenomenon still remain unclear. Recent experimental evidence indicates that the distribution of electromagnetic power is actually the main limiting factor of the arc initiation, instead of applied electric field and the cathode material as previously assumed. This project aims to understand the physics underlying the power supply limitations on the vacuum breakdown initiation by developing computational models that predict its behavior. A direct comparison with experimental results shall result in the exact determination of the desired design characteristics for structures that suffer from vacuum breakdown.

Topic

Modeling and Simulations

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