

Abstract Submitted
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A 3-D Computation of the Microwave Emission Spectrum of the Cold Atmospheric Helium Plasma Jet¹ YI LIU, LI LIN, MICHEAL KEIDAR, The George Washington University, MPNL TEAM — As a source of the reactive species, electromagnetic emissions, and acoustic waves, the cold atmospheric plasma jet (CAPJ) is currently widely and intensively used for biomedicine, material processing, and environmental science. One of the most critical applications is the cancer treatment induced by CAPJ chemistry. Recent studies show that microwave emissions from a CAPJ may also lead to the apoptosis of cells, which is a new point of view of plasma medicine. To reveal the microwave emission spectrum of the CAPJ and its treatment mechanism, a helium CAPJ and its 3-D radiation field were simulated. The electromagnetic radiation field is a superposition of three components. The first one is the bulk current emission. The movement of net charge distribution in each simulation grid provides a current which is considered as a linear wire antenna. The second one is the plasma oscillation emission, where the thermal electron motion and particle collisions are considered. The third one is the Bremsstrahlung emission due to the e-e collisions and e-ion collisions. As a result, the spectrum of the 3-D CAPJ radiation field is obtained, which is highly informative to future research on the physical effects of CAPJ treatments.

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