

# COMPUTER SIMULATION OF ELECTROSPRAYING OF VOLATILE LIQUIDS

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A model has been developed and implemented in a numerical code to simulate electrospays of volatile liquids. We have accounted for all the relevant phenomena that happen in such systems: (1) droplet dynamics (Grifoll and Rosell-Llompарт, 2012), considering evaporation; (2) surrounding gas flow field (either induced externally or by the droplets' motion; Arumugham-Achari *et al.*, 2013); (3) vapor transport by convection and diffusion (Wilhelm *et al.*, 2003); (4) Coulomb explosions; and (5) transport of residual charge that results from evaporation and Coulomb explosions. For the case of a methanol electro spray, Figure 1(a) shows a snapshot of a simulated spray plume, with the streamlines of the air flow induced by the droplets' drag. Panel (b) shows the intensity map of the volumetric rate of charge production associated with droplets with diameter  $d$  below  $d^*$  ( $=1 \mu\text{m}$ ). Since this charge is mostly due to Coulomb explosions, the different bands delimitate the regions of intense explosions.

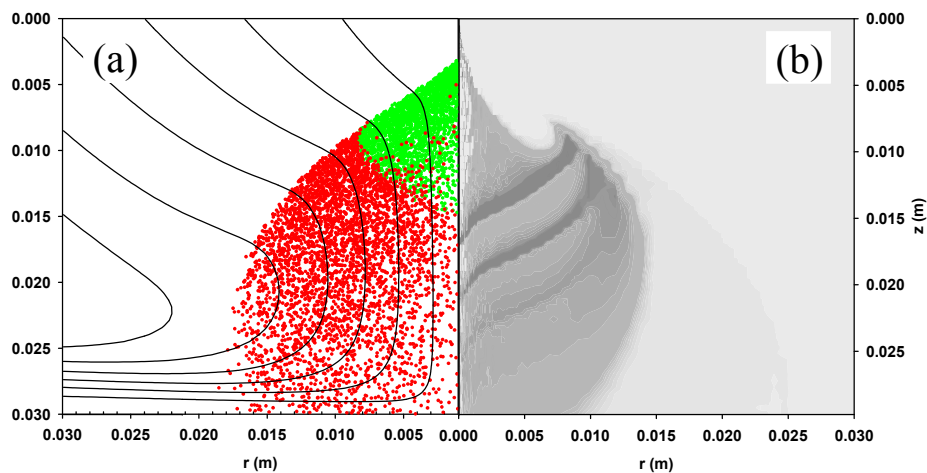


Figure 1. (a) Snapshot of evaporating methanol electro spray droplets (initial  $d_{10} = 8 \mu\text{m}$ ; coefficient of variation = 10%) and induced air flow streamlines. (b) Mono-mobile charge source rate from droplets with  $d < d^* = 1 \mu\text{m}$ .

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## References

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