Shrimpton

# Charge Injection Systems

Physical Principles, Experimental and Theoretical Work

C Specific heat at constant pressure p D Displacement field D Diffusion coefficient d D Orifice diameter E Electric field E Electron charge F Force G Acceleration due to gravity I Current J Current flux K Conductivity k Boltzmann constant B L Atomizer geometry: length from electrode tip to orifice plane i L Atomizer geometry: length of orifice channel o P Polarization Q Flow rate/Heat flux Q Charge r Atomizer geometry: electrode tip radius p T Time T Temperature U Velocity V Voltage W Energy X Distance Nomenclature (Greek) Thermal expansion coefficient ? Permittivity ? Permutation operator ? ijk Ion mobility ? VI Nomenclature Debye length ? D ? Dynamic viscosity ? Mass density Surface tension ? T Electrical conductivity ? ? Timescale ? Vorticity Nomenclature (Subscripts) Reference state ? o Cartesian tensor notation ? ijk Volume density (? per unit volume) ? v Surface density (? per unit area) ? s Linear density (? per unit length) ? l 'critical' state ? c Bulk mean injection ? inj Nomenclature (Superscripts) Time or ensemble averaged ? Contents Contents 1 Introduction…….. 1 1.1 Introduction and Scope…….. 1 1.2 Organization…….. 3 2 Electrostatics, Electrohydrodynamic Flow, Coupling and Instability…….. 5 2.1 Electrostatics…….. 5 2.1.1 The Coulomb Force…….. 5 2.1.2 Permittivity…….. 6 2.1.3 Conductors, Insulators, Dielectrics and Polarization……. 6 2.1.4 Gauss'sLaw…….. 8 2.2 Mobility and Charge Transport…….. 10 2.2.1 Introduction…….. 10

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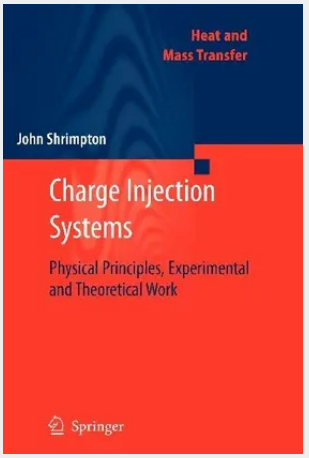


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