Immersed Interface Method for Drop Electrohydrodynamic
HERVE NGANGUIA, YUAN-NAN YOUNG, New Jersey Institute of Technology,
ANITA LAYTON, Duke University, WEI-FAN HU, MING-CHIH LAI, National
Chiao Tung University — A numerical scheme based on the immersed interface
method (IIM) is developed to simulate the dynamics of an axisymmetric viscous
drop under an electric field. In this work, the IIM is used to solve both the fluid
velocity field and the electric potential field. Detailed numerical studies on the nu-
merical scheme shows second-order convergence. Moreover, the numerical scheme
is further validated by the good agreement with published analytical models, and
results from the Boundary Integral method. The IIM code is used to investigate in-
ertia effects and/or time-varying electric field on drop electro-deformation. Results
from the simulations illustrate how the inertia effects and time dependence of the
electric field affect the electro-deformation of a viscous leaky dielectric drop.

Herve Nganguia
New Jersey Institute of Technology