Dissertation

Sensors and Actuators for Single Particles and Cells

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Contents

Nomenclature

0.1 List of Abbreviations

Symbol	Description
APC	automatic power control
CCD	charge coupled device
CHO	Chinese hamster ovary
CMOS	complementary metal oxide
DEP	dielectrophoresis
DVD	digital versatile disc
FACS	fluorescent activated cell sorting
FEM	finite element model
nDEP	negative dielectrophoresis
PBS	phosphate buffered saline
PCB	printed circuit board
pDEP	positive dielectrophoresis
PMT	photomultiplier tube
SU-8	epoxy-based negative photoresist
VCM	voice coil motor

0.2 List of Symbols

Constant	Description	Unit
ε	relative permittivity	-

Constant	Description	Unit
ε_0	vacuum permittivity	$8.854 \cdot 10^{-12}$ F/m
σ	conductivity	S/m
$\Re[x]$	real part of a number x	

0.3 List of Variables

Symbol	Description	Unit
K	Clausius Mossotti factor	-
$\mathbf{F}_{\mathrm{DEP}}$	dielectrophoretic force (vector)	N
R	particle radius	m
$E_{0,\mathrm{RMS}}$	absolute value of the electric field (RMS)	V/m
$\underline{K}(\omega)$	complex Clausius Mossotti function	-
$\underline{\varepsilon}$	complex permittivity	
f	frequency	Hz
$\mathbf{F}_{\mathrm{drag}}$	drag force on a particle (vector)	N
η	viscosity	Pa·s
m	mass	kg
$\mathbf{v}_{\mathrm{l}}$	local liquid velocity	m/s
$\mathbf{v}_{\mathrm{p}}$	particle velocity	m/s
x, y, z	coordinates	m
$v_{\mathrm{p,x}}$,$v_{\mathrm{p,y}}$,$v_{\mathrm{p,z}}$	velocity components	m/s
n	refractive index	-
κ	absorption coefficient	-
$\tilde{n} = n - j\kappa$	complex refractive index	-
λ	optical wavelength	m
FE	focus error signal	-