Nomenclature

$A_{\alpha\beta}$, $\tilde{A}_{\alpha\beta}$	matrices for determining c_α
B_α, $\tilde{B}_\alpha$	vectors for determining c_α
a_m, b_n	polynomial coefficients for Abel transform
B	MCA energy bin number
B_p	MCA energy bin number of peak
B_w	MCA energy bin width of peak
C_α	conductivity parameters
c_α	increments in conductivity parameters
c_{mn}, d_{nm}	reconstruction coefficient matrices for Abel transform
D	cylinder or vessel diameter
d_b	diameter of a sphere with the same volume as a prescribed bubble
$f(r, R)$	inverse Abel transform of $g(x, R)$
$g(x, R)$	Abel transform of $f(r, R)$
H_0	height of gas-liquid interface in bubble column without gas flow
H	height of gas-liquid interface in bubble column with gas flow
I	intensity (counts per second) of gamma beam
i, j	FEM nodal indices
I_e	current scale for electrodes in EIT
I_0	intensity (counts per second) of gamma beam initially
I_h	MCA intensity height of peak
J_n	normal current flux
$\mathbf{J}$	current flux vector
k, m, n, p	FEM nodal indices for nodes at electrodes
k_0, k_1, k_2	parameters for Gaussian fit to peak in MCA spectrum
L	either path length or height of measurement above vessel bottom
M_{ij}	global stiffness matrix
$M_{\alpha ij}$	derivative of the global stiffness matrix M_{ij} with respect to C_α
m_β, n_β	conductivity function internal parameters
N_e	number of electrodes in EIT system
N_n	number of nodes in FEM representation of EIT
N_σ	number of conductivity parameters in EIT
$\mathbf{n}$	outward normal unit vector
ΔP	pressure difference between two pressure transducers for DP technique
P	pressure
P_β	conductivity function internal parameters
R	cylinder or vessel radius, or domain length scale in EIT
R_β	conductivity function internal parameters
r	cylindrical coordinate
s	arc length
$s^{(k)}$	arc length location of electrode k in EIT
T	temperature

t	time
U_G	gas superficial velocity in bubble column
U_1	velocity in formula for terminal bubble velocity
U_2	velocity in formula for terminal bubble velocity
U_T	terminal velocity of an isolated gas bubble in a liquid
V	voltage
$V^{(k)}(\mathbf{x})$	voltage field for current injection and withdrawal at electrode k and node 0
$V^{(mn)}(\mathbf{x})$	voltage field for current injection and withdrawal at electrodes m and n
$V_i^{(k)}$	voltage at node i for current injection and withdrawal at electrode k and node 0
$V_i^{(mn)}$	voltage at node i for current injection and withdrawal at electrodes m and n
$V_k^{(mn)}$	voltage at electrode k for current injection and withdrawal at electrodes m and n
$V_{k,1}^{(mn)}$	voltage $V_k^{(mn)}$ when $\sigma = \sigma_1(\mathbf{x};\{C_\alpha\})/C_1$, $\alpha = 2, \ldots, N_\sigma$, and $C_1 = 1$
$V_0^{(mn)}$	arbitrary voltage offset, an adjustable parameter in EIT
$\partial V_i^{(k)}/\partial C_\alpha$	Jacobian
$v_k^{(mn)}$	experimental voltage at electrode k for injection, withdrawal at electrodes m, n
W	vertical separation of two pressure transducers for DP technique
$\mathbf{x}$	coordinate vector
x	Cartesian coordinate, horizontal, normal to paths
y	Cartesian coordinate, normal to x and z, parallel to paths
z	Cartesian or cylindrical coordinate, vertical, along cylinder axis
α, β	indices for conductivity parameters
δ_{ij}	Kronecker delta function
$\delta(s)$	Dirac delta function
ε	phase volume fraction or "holdup"
Γ	rms difference between computational and experimental EIT voltages
$\phi_i(\mathbf{x})$	FEM basis function
$\psi(x, R)$	$g(x, R)/[2\sqrt{R^2 - x^2}]$
η	viscosity (absolute)
μ	attenuation coefficient
ρ	density
σ	electrical conductivity
σ_0	representative value of electrical conductivity
σ_1	electrical conductivity function $\sigma = \sigma_1(\mathbf{x};\{C_\alpha\})/C_1$, $\alpha = 2, \ldots, N_\sigma$
τ	gamma detection time constant
ζ	surface tension
$(\ )_a$	pertaining to air
$(\ )_G$	pertaining to gas
$(\ )_L$	pertaining to liquid
$(\ )_S$	pertaining to solid
$(\ )_s$	pertaining to glass spheres
$(\ )_w$	pertaining to water

$[\ ]_{av}$	average over measurement plane
BBC	boxed bubble column
BEI	bulk electrical impedance
BEM	boundary-element method, a numerical method
CMRR	common mode rejection ratio for an amplifier
DP	differential pressure
EBP	electrical bubble probe
EIT	electrical-impedance tomography
EITA3D	FEMEIT-like code for three-dimensional voltage fields, axisymmetric conductivity
FEM	finite-element method
FEMEIT	finite-element method electrical-impedance tomography code
FIDAP	commercial finite-element method code (Fluid Dynamics International)
GDT	gamma-densitometry tomography
ICI	insulating cylindrical inclusion
LR	level rise
LSF	liquid-solid flow
MCA	multi-channel analyzer
MUX	multiplexer
PSD	phase-sensitive demodulator
RTR	real-time radiography
SBCR	slurry bubble column reactor
SCA	single-channel analyzer
TBC	transparent bubble column
XRT	x-ray tomography
VCCS	voltage-controlled current source
WCD	wax/catalyst disk
2DynaEIT	boundary-element method electrical-impedance tomography code (Dynaflow, Inc.)
2DynaEIT_fwd	code to generate validation for 2DynaEIT (Dynaflow, Inc.)
`ansoln`	code to generate analytical voltage fields from infinitesimal strip electrodes
`fuldat`	code to take adjacent-electrode EIT data and generate a full EIT data set
`msheit`	code to generate a triangular mesh on a circular domain for FEMEIT
`postfd`	code to create a FIDAP neutral file for postprocessing from FEMEIT output