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List of Symbols

Symbol	*Description*
a	distance of measurement place
c	specific heat capacity of thread material
c_{air}	specific heat capacity of air
c_{f}	air friction coefficient
c_{p}	specific heat capacity of polymer
d	diameter of capillary hole of spinneret
d_{f}	dampening factor
d_{q}	standard deviation
d_{q}^2	quadratic dispersion (variance)
ddr	draw down ratio
$\frac{\mathrm{d}}{\mathrm{d}x}$, $\frac{\mathrm{d}}{\mathrm{d}t}$	derivatives in ordinary DEs
$\frac{\mathrm{d}^u}{\mathrm{d}t^u}$	u^{th} derivative to the time, LAPLACIAN p
$\mathrm{d}x$, $\mathrm{d}t$, $\mathrm{d}t^u$,	infinitesimal quantity of the appropriate size
$\mathrm{d}l$, $\mathrm{d}m$, $\mathrm{d}p$,	infinitesimal quantity of the appropriate size
$\mathrm{d}Tt_{\mathrm{o}}$, $\mathrm{d}T$, $\mathrm{d}T_{\mathrm{y}}$	infinitesimal quantity of the appropriate size
$\mathrm{d}M$, $\mathrm{d}S_{\mathrm{y}}$	infinitesimal quantity of the appropriate size
$\mathrm{d}\alpha$	infinitesimal quantity of the appropriate size
e	asymmetry parameter
$\mathrm{e}^{\mu\alpha}$, $\mathrm{e}^{\mu\alpha_{\mathrm{m}}}$, $\mathrm{e}^{\mu_{\mathrm{m}}\alpha_{\mathrm{m}}}$	rope friction factor
$\mathrm{e}^{\mathrm{j}\varphi(\omega)}$	factor of the phase shift between cause- and effect oscillation in the complex plane
f	HERRMAN's orientation factor (Chap. 3)
f	disturbance frequency, frequency in the dimension Hz
f_{am}	amorphous orientation factor

continuation

Symbol	*Description*
f_{cr}	crystalline orientation factor
f_{c}	critical frequency
f_{ch}	critical frequency of heat transfer dynamic
$f_{\mathrm{c1}},\ f_{\mathrm{c2}}$	critical frequencies of drafting zones 1 and 2
f_{m}	mains frequency
Δf_{m}	mains frequency change
$f_{\mathrm{P}},\ f_{\mathrm{P1}},\ f_{\mathrm{P2}}$	frequencies of the changes
f_{ts}	frequency of traverse motion thread guide
$\widetilde{\Delta f_{\mathrm{m}}}$	sinusoidal mains frequency change
$f(t)$	time dependent function
$f_{\mathrm{x}},\ f_{\mathrm{y}}$	components of external force density, cartesian coordinates
g	gravitational acceleration
$g(y)$	reduced stream function, cartesian coordinates
h	glass level
h_{m}	glass level, mean value
Δh	glass level change
$h(r)$	reduced stream function, radial coordinates
i	running (sequence) index
$i \cdot \Delta t$	time shift (power density spectrum)
j	imaginary unit $\mathrm{j}^2 = -1$
k	running (sequence) index
k	BOLTZMANN constant (Chap. 3)
k	transfer factor of heating transformer (Chap. 4)
$k(y)$	force density function
$k \cdot \Delta t$	time shift (correlation function)
l	length of the appropriate zone or roll setting
l_{m}	length of the appropriate zone or roll setting, mean value
Δl	length change of the appropriate zone or roll setting
$\widetilde{\Delta l}$	sinusoidal length change of the appropriate zone or roll setting
l_{b}	length of bobbin
l_{ext}	input line extension
$l_{\mathrm{ext}}/l_{\mathrm{m}}$	extension factor
l_{f}	middle staple length of fibres
l_{h}	high of traverse motion triangle

continuation

Symbol	*Description*
l_s	distance from spinneret
l_t	thread length of one twist
l_u	streched, untwisted length of one twist
l_0	length of unloaded fibre/yarn/thread
l_1	length of F loaded fibre/yarn/thread
$l_1,\ l_2,\ l_3$	lengths of heated godet systems
l_1	length of the roll setting zone 1
$l_{1\mathrm{m}}$	length of the roll setting zone 1, mean value
Δl_1	length change of the roll setting zone 1
l_2	length of the roll setting zone 2
$l_{2\mathrm{m}}$	length of the roll setting zone 2, mean value
Δl_2	length change of the roll setting zone 2
$l_{\mathrm{T_g}}$	distance spinneret-glass transition point
m	running (sequence) index
n	running (sequence) index
n	AVRAMI exponent (crystallisation rate, Chap. 3)
n_b	revolution number of bobbin motor
n_bm	revolution number of bobbin motor, mean value
$\Delta n_\mathrm{b},\ \Delta n_\mathrm{b1},\ \Delta n_\mathrm{b2}$	revolution number changes of bobbin motor
$\widetilde{\Delta n}$	sinusoidal revolution number change of bobbin motor
n_b	revolution number of bobbin
n_i	revolution number of input drawing godet
n_o	revolution number of output drawing godet
n_p	revolution number of motor spinning pump
n_s	revolution number of false twist spindle
n_sm	revolution number of false twist spindle, mean value
Δn_s	revolution number change of false twist spindle
$\widetilde{\Delta n_\mathrm{s}}$	sinusoidal revolution number change of false twist spindle
p_e	pressure of melt from extruder
p_s	pressure of melt before the spinneret
$p^u = \dfrac{\mathrm{d}^u}{\mathrm{d}t^u}$	LAPLACIAN
p_ν	zero value of the integrand of Eq. 2.42
$p_{,\mathrm{x}},\ p_{,\mathrm{y}}$	components of pressure gradient, cartesian coordinates
q	number of worker-angle-stripper pairs (roller top card, Chap. 4)

continuation

Symbol	*Description*
q_i	cross section of capillary hole
q_im	cross section of capillary hole, mean value
Δq_i	cross section change of capillary hole
$\widetilde{\Delta q_\mathrm{i}}$	sinusoidal cross section change of capillary hole
q_o	throughput of one single filament
q_s	cross section of ready formated fibre
q_sm	cross section of ready formated fibre, mean value
Δq_s	cross section change of ready formated fibre
$\widetilde{\Delta q_\mathrm{s}}$	sinusoidal cross section change of of ready formated fibre
$\dot{q}_\mathrm{s}$	derivative of q_s to t
$q_\mathrm{x},\ q_\mathrm{y}$	components of heat flow
r_g	gear ratio
s	length of capillary hole of spinneret
t	running time
Δt	time interval
Δt_1	necessary time shift between time functions of tensile force and fineness to continuous quotient calculation to fineness related yarn tensile force (Fig. 6.16)
t_0	time to the start point zero
tm_a	amplitude of traverse motion at winder
tm_f	frequency of traverse motion at winder
u	order of the LAPLACIAN
v	fibre/yarn/thread velocity
v_0	extrusion velocity
v_a	velocity of quenching air
Δv_a	velocity change of quenching air
Δv_a	velocity change of quenching air
v_air	air velocity
v_c	coefficient of variation (Chap. 6)
v_i	velocity of input fibre/yarn/thread or godet or present velocity of twisted thread in texturing zone
v_input	velocity of input fibre mass
v_im	velocity of input fibre/yarn/thread or godet or present velocity of twisted thread in texturing zone, mean values

continuation

Symbol	*Description*
Δv_i	velocity change of input fibre/yarn/thread or godet or present velocity change of twisted thread the texturing zone
$\widetilde{\Delta v_\mathrm{i}}$	sinusoidal velocity change of input fibre/yarn/thread
$v_\mathrm{i}(t)$	velocity of input fibre/yarn/thread or godet, time function
$v_{\mathrm{i}1}(t)$	velocity of input fibre/yarn/thread, level 1, time function
$v_{\mathrm{i}2}(t)$	velocity of input fibre/yarn/thread, level 2, time function
v_o	velocity of output or take-down velocity of fibre/yarn/thread or godet
v_output	velocity of output fibre mass
v_om	velocity of output fibre/yarn/thread or godet, mean value
Δv_o	velocity change of output fibre/yarn/thread or godet
$\widetilde{\Delta v_\mathrm{o}}$	sinusoidal velocity change of ouput fibre/yarn/thread or godet
v'_o	velocity of twisted thread in the peel off moment
$v_\mathrm{o}(t)$	velocity of output fibre/yarn/thread or godet, time function
$v_{\mathrm{o}1}(t)$	velocity of output fibre/yarn/thread, level 1, time function
$v_{\mathrm{o}2}(t)$	velocity of output fibre/yarn/thread, level 2, time function
v_s	take-down (spinning) velocity of formated fibre
v_sm	take-down (spinning) velocity of formated fibre, mean value
$\Delta v_\mathrm{s},\ \Delta v_{\mathrm{s}1},\ \Delta v_{\mathrm{s}2}$	take-down (spinning) velocity changes of formated fibre
$\widetilde{\Delta v_\mathrm{s}}$	sinusoidal take-down (spinning) velocity change of formated fibre
v_tm	linear velocity of traverse motion thread guide, mean value
$v_0,\ v_\mathrm{B}$	(initial) quenching air velocity
v_L	take-up velocity
$v_\mathrm{x},\ v_\mathrm{y}$	velocity components of air, cartesian coordinates
$v_\mathrm{x},\ v_\mathrm{r}$	velocity components of air, radial coordinates
v_z	velocity of middle drafting godet or input velocity of untwisted thread in texturing zone

continuation

Symbol	*Description*
v_{zm}	velocity of middle drafting godet or velocity of input dead time line or velocity of the tensionless fibre/yarn/thread or input velocity of untwisted thread in texturing zone, mean values
Δv_z	velocity change of middle drafting godet or velocity change of input dead time line or input velocity change of untwisted thread in texturing zone
$\widetilde{\Delta v_z}$	sinusoidal velocity change of untwisted thread in texturing zone
v'_z	velocity of twisted thread in texturing zone
$v_{\|\|},\ v_\perp$	axial and cross air velocity
w	bending tongue shift
w_m	bending tongue shift, mean value
Δw	bending tongue shift change
$\widetilde{\Delta w}$	sinusoidal bending tongue shift change
x	coordinate in fibre direction, distance from spinneret (Chap. 3)
$x(t)$	time function (Chap. 2)
$\bar{x}$	mean value of the time function (Chap. 2)
Δx	cause variable (Chap. 2)
x_0	length measurement corresponding to Eqs. 5.96, 5.97
$x_1, ..., x_n,$ $x_i,\ x_{i+k}$	discrete values of the time function $x(t)$ (Chap. 2)
x_i	input fibre mass/time (carding engines, Figs. 4.15, 4.18)
x_{im}	input fibre mass/time (carding engines), mean value
Δx_i	input fibre mass/time change (carding engines, Figs. 4.16, 4.18)
$\widetilde{\Delta x_i}$	sinusoidal input fibre mass/time change (carding engines)
$\Delta x,\ \Delta x_1, ..., \Delta x_n,$ $\Delta x_{i1},\ \Delta x_{i2}$	partial fibre mass/time changes (roller top card, Figs. 4.16, 4.17)
x_o	output fibre mass/time (carding engines, Figs. 4.15, 4.18)
x_{om}	output fibre mass/time (carding engines), mean value
Δx_o	output fibre mass/time change (carding engines, Figs. 4.16, 4.18)
$\widetilde{\Delta x_o}$	sinusoidal output fibre mass/time change (carding engines)

continuation

Symbol	*Description*
Δx_{o2}	partial fibre mass/time change (roller top card, Fig. 4.16)
x_s	distance to solidification point
$\widetilde{\Delta x}(\omega)$	vector of the sinusoidal disturbance of the independent cause variable
$y(t)$	time function (Chap. 2)
$y_1, ..., y_n,\ y_{i+k}$	discrete values of the time function $y(t)$ (Chap. 2)
$\bar{y}$	mean value of the time function (Chap. 2)
Δy	effect variable (Chap. 2)
$\Delta y_1,\ \Delta y_2, ..., \Delta y_n$	partial fibre mass/time changes (roller top card, Figs. 4.16, 4.17)
$\widetilde{\Delta y}(\omega)$	vector of the sinusoidal disturbance of the dependent response (effect) variable
$\widetilde{\Delta y}(\omega_0)$	vector of the sinusoidal disturbance of the dependent response (effect) variable for ω_0
$\widetilde{\Delta y}(\omega_1)$	vector of the sinusoidal disturbance of the dependent response (effect) variable for ω_1
$\widetilde{\Delta y}(\omega_2)$	vector of the sinusoidal disturbance of the dependent response (effect) variable for ω_2
$\widetilde{\Delta y}(\omega_3)$	vector of the sinusoidal disturbance of the dependent response (effect) variable for ω_3
z	number of capillary holes of spinneret or number of total twists in the zone l_m or number of thread wraps around heated godets
z_i	number of fibres in cross section of coming in sliver
z_{im}	number of fibres in cross section of coming in sliver, mean value
Δz_i	change of number of fibres in cross section of coming in sliver
$\widetilde{\Delta z_i}$	sinusoidal change of number of fibres in cross section of coming in sliver
z_o	number of fibres in cross section of coming out sliver
z_{om}	number of fibres in cross section of coming out sliver, mean value
z_z	number of fibres in cross section of coming out/in sliver from/to drafting zones 1/2
z_{zm}	number of fibres in cross section of coming out/in sliver from/to drafting zones 1/2, mean value

continuation

Symbol	*Description*
Δz_z	change of number of fibres in cross section of coming out/in sliver from/to drafting zones 1/2
A	actuator device
A	filament cross section
$A_a,\ B_a,\ C_a,\ E_a$	abbreviation factors in the Eqs. 5.23, 5.24
$A_b,\ B_b,\ C_b$	abbreviation factors in the Eqs. 5.38, 5.39
A_s	surface of glass melt
A_{zm}	to the fineness related rise of the force-elongation-curve of fibre/yarn/thread
ACF	auto-correlation function
APSF	auto-power density spectrum function
B	width of filament bundle in multifilament spinning, quenching air direction
$C_1,\ C_2,\ C_3$	constants
CAC	coordination automatic controller
CC	coordination controller
CCF	cross-correlation function
CPCD	connection programmed controller device
CV	coefficient of variation (Chap. 3)
D	filament diameter (Chap. 3)
D	wind-up/godet diameter
D_m	wind-up/godet/friction element diameter, mean value
ΔD	wind-up/godet diameter change
$\widetilde{\Delta D}$	sinusoidal wind-up diameter change
D_0	diameter of capillary hole
D_i	diameter of input godet
D_o	diameter of output godet
D_L	filament diameter at take-up distance L (Chap. 3)
D_y	fibre/yarn/thread diameter
De	*Deborah* number
DE	differential equation
DR	draw ratio
DMCC	digital multi channel controller
DPP	data processing peripherals
E	elongational elastic modulus (melt)
E_y	elastic modulus of fibre/yarn/thread
E_{yi}	elastic modulus of input fibre/yarn/thread

continuation

Symbol	*Description*
E_{yim}	elastic modulus of input fibre/yarn/thread, mean value
E_{yo}	elastic modulus of output fibre/yarn/thread
E_{yom}	elastic modulus of output fibre/yarn/thread, mean value
E_{a}	activation energy (ARRHENIUS)
EDPS	electronic data processing system
$F,\ F_1,\ F_2$	tensile forces of fibre/yarn/thread
F_{m}	tensile force of fibre/yarn/thread, mean value
ΔF	tensile force change of fibre/yarn/thread
$\widetilde{\Delta F}$	sinusoidal tensile force change of fibre/yarn/thread
ΔF_1	tensile force change (amplitude) of fibre/yarn/thread
$F(t)$	tensile force of fibre/yarn/thread, time function
F_{m}	mean value of $F(t)$
F_{i}	discontinuous value of time function $F(t)$
$F_1(t)$	tensile force of fibre/yarn/thread, level 1, time function
$F_2(t)$	tensile force of fibre/yarn/thread, level 2, time function
F_{b}	tensile force at break of fibre/yarn/thread
$F_{\mathrm{T_g}}$	tensile force of fibre/yarn/thread at the glass transition temperature T_{g}
F_{i}	discontinuous value of time function $F(t)$ (Chap. 6)
F_{i}	tensile force of fibre/yarn/thread at friction thread line input
F_{o}	tensile force of fibre/yarn/thread at friction thread line output
F_0	initial force (at capillary)
F_{drag}	air drag tensile force
F_{inert}	inertial tensile force
F_{grav}	gravitational tensile force
F_{surf}	surface tensile force
F_{rheo}	(rheological) fibre force
F_{L}	take-up force at distance L
F_{y}	yarn tensile force (drawing process)
FT	false twist
G	modulus (upper convected MAXWELL model)
$G(p)$	dynamic transfer function
$G_1(p)$	dynamic transfer function drafting zone 1
$G_2(p)$	dynamic transfer function drafting zone 2

continuation

Symbol	*Description*
$G_{\mathrm{D}}(p)$	dynamic transfer function of two steps drafting process
$G_1(p)...G_5(p)$	dynamic transfer functions of FT-texturing process
$\|G_1(\mathrm{j}f)\|...\|G_5(\mathrm{j}f)\|$	normalized amplitude frequency responses of FT-texturing process
$G_{\mathrm{fc}}(p)$	dynamic transfer function of stationary flat card
$G_{\mathrm{fc}}(\mathrm{j}\omega)$	complex frequency response of stationary flat card
$\|G_{\mathrm{fc}}(\mathrm{j}\omega)\|$	amplitude frequency response of stationary flat card
$\|G_{\mathrm{fc}}(\mathrm{j}\lambda_{\mathrm{o}})\|$	amplitude frequency response of stationary flat card (Fig. 4.19)
$G_{\mathrm{rc}}(p)$	dynamic transfer function of roller top card
$G_{\mathrm{W1}}(p)...G_{\mathrm{Wq}}(p)$	dynamic transfer functions of worker-angle-stripper-pairs
$G(\mathrm{j}\omega)$	complex frequency response
$\|G(\mathrm{j}\omega)\|$	amplitude frequency response
$G(\mathrm{j}f)$	complex frequency response
$\|G(\mathrm{j}f)\|$	amplitude frequency response
$\|G[\mathrm{j}(f/f_{\mathrm{c}})]\|$	normalized amplitude frequency response
$G_{\mathrm{D}}(\mathrm{j}\omega)$	complex frequency response of two steps drafting process
$\|G_{\mathrm{D}}(\mathrm{j}\omega)\|$	amplitude frequency response of two steps drafting process
G_{i}	abbreviation for dynamic transfer function $G_{\mathrm{i}}(p)$
$G_1...G_{18}$	single transfer elements of functional block diagram according to Fig. 4.12 and Table 4.2, abbrev. for dynamic transfer functions $G_1(p)...G_{18}(p)$
$G_{\mathrm{z1}}...G_{\mathrm{z9}}$	disturbance transfer functions (Table 4.3), abbrev. for dynamic transfer functions $G_{\mathrm{z1}}(p)...G_{\mathrm{z9}}(p)$
$\|G_{\mathrm{z1}}\|...\|G_{\mathrm{z9}}\|$	disturbance amplitude frequency responses (Table 4.3, Fig. 4.13), abbrev. for amplitude frequency responses $\|G_{\mathrm{z1}}(\mathrm{j}f)\|...\|G_{\mathrm{z9}}(\mathrm{j}f)\|$
Gr	GRASHOF number
ΔH	heat of fusion
I_{h}	heating current
I_{hm}	heating current, mean value
ΔI_{h}	heating current change
$\mathrm{Im}(\omega)$	imaginary part of complex frequency response
K	fibre mass distribution coefficient (roller top card, Fig. 4.17)

continuation

Symbol	*Description*
K_a	fibre mass distribution coefficient (roller top card, Fig. 4.16)
$K_\mathrm{F}(\tau),\ K_\mathrm{F}(k \cdot \Delta t)$	single values of ACF of time function $F(t)$ for τ or $k \cdot \Delta t$
K_h	polymer specific constant for the heat transfer
K_p	polymer specific constant for conversion fibre/yarn/thread fineness to diameter
$K(T, \sigma)$	crystallisation rate
K_max	crystallisation rate constant
$K(\tau)$	auto- or cross-correlation function, integral representation
$K(k \cdot \Delta t)$	auto- or cross-correlation function, sum representation
$K_{\mathrm{FTt_o}}(\tau)$	cross-correlation function of $F(t)$ and $Tt_\mathrm{o}(t)$
$K_{\mathrm{FTt_o}}(0)$	start value of $K_{\mathrm{FTt_o}}(\tau)$ for $\tau = 0$
$K_{\mathrm{F}\sigma}(\tau)$	cross-correlation function of $F(t)$ and $\sigma(t)$
$K_{\mathrm{F}\sigma}(0)$	start value of $K_{\mathrm{F}\sigma}(\tau)$ for $\tau = 0$
$K_{\mathrm{Tt_o}\sigma}(\tau)$	cross-correlation function of $Tt_\mathrm{o}(t)$ and $\sigma(t)$
$K_{\mathrm{Tt_o}\sigma}(0)$	start value of $K_{\mathrm{Tt_o}\sigma}(\tau)$ for $\tau = 0$
K_s	shortening factor (false twist texturing process)
K_S	amplification factor of transfer element G_4
$K_{\overline{\mathrm{S}}}$	amplification factor of transfer element G_8
$K_{\mathrm{K(T_0)}}$	amplification factor of transfer element G_9
K_K	amplification factor of transfer element G_{12}
K_U	amplification factor of transfer element G_{13}
$K_\mathrm{W1},\ K_\mathrm{W2}$	polymer specific constants in Eqs. 5.96, 5.97
$K_{\overline{\mathrm{U}}}$	amplification factor of transfer element G_{14}
L	LAPLACE-transformation
L_{-1}	LAPLACE-retransformation
L	take-up distance, length of take-up channel (Chap. 3)
L_c	cooling length
L_cl	necessary cutting length of fibre/yarn/thread
L_d	delay thread length
L_dv	delay thread length for a velocity disturbance Δv_i
$L_{\mathrm{d}\mu}$	delay thread length for a velocity disturbance $\Delta\mu$
L_gl	necessary gauge length of fibre/yarn/thread
M	measuring device
M	molecular weight (Chap. 3)
M	fibre/yarn/thread mass at the friction element (Chap. 5)
MC	micro computer
MP	micro processor

continuation

Symbol	*Description*
MPC	micro processor controller
MVC	measuring value computer
MVCO	measuring value concentrator
N	number of filaments in fibre bundle
$N(\Theta)$	orientational distribution function
N_a	abbreviation factor in Eq. 5.56
N_h	heating power
N_hm	heating power, mean value
ΔN_h	heating power change
Nu	NUSSELT number
PA	poly(amide)
PET	poly(ethylene terephthalate)
PP	poly(propylene)
PCD	programmable controller device
P_i	LEGENDRE polynomials
Pr	PRANDTL number
Q	mass throughput of polymer
Q_air	(mass) flow rate of air
Q_i	glass mass inflow
$\Delta Q_\mathrm{i},\ \Delta Q_\mathrm{i1},\ \Delta Q_\mathrm{i2}$	glass mass inflow changes
$\widetilde{\Delta Q_\mathrm{i1}}$	sinusoidal glass mass inflow change
Q_s	throughput through the spinneret
ΔQ_s	throughput change through the spinneret
$\widetilde{\Delta Q_\mathrm{s}}$	sinusoidal throughput change through the spinneret
Q_sm	throughput through the spinneret, mean value
$\Delta Q_\mathrm{s},\ \Delta Q_\mathrm{s1},\ \Delta Q_\mathrm{s2}$	throughput changes through the spinneret
Q_p	throughput through the spinning pump
R	gas constant (Chap. 3)
R	filament (fibre) radius (Chap. 3)
R	reduction factor (Chap. 5)
R_y	fineness related tensile force F/Tt_1
R_0	radius of capillary hole, initial filament radius
$R_1,\ R_2$	inner and outer radius of radially symmetric filament bundle
$Re,\ Re_{\|\|},\ Re_\perp$	REYNOLDS number, related to $v_{\|\|}, v_\perp$
$R_{\mathrm{T_g}}$	fineness related tensile force of fibre/yarn/thread at the glass transition temperature T_g

continuation

Symbol	*Description*
ΔR_{T_g}	fineness related tensile force change of fibre/yarn/thread at the glass transition temperature T_g
$\mathrm{Re}(\omega)$	real part of frequency response
R_h	heating resistance
R_{hm}	heating resistance, mean value
ΔR_h	heating resistance change
R_s	flow resistance of spinneret holes
$\mathrm{Res}[S(p)]$	residue of $S(p)$
S_y	surface of disc-shaped pice
$S(\omega),\ S(f)$	power density spectrum function
$S_F(f)$	single value of the APSF of time function $F(t)$ for f
$S(p)$	abbreviation of the integrand of Eq. 2.42
T	temperature or time period of the integration range
T_A	necessary maximum analysis time
$T_1,\ T_2, ..., T_n$	thread temperatures T_y after pass of single heating and cooling lines
T_0	extrusion temperature, initial temperature
$T_a,\ T_{air}$	temperature of air
T_b	temperature at beginning of heat transfer
T_{bf}	bobbin formation time
T_c	time constant
T_{ch}	time constant of heat transfer dynamic
$T_{c1},\ T_{c2}$	time constants (stationary flat card)
$T_{cd1},\ T_{cd2}$	time constants of drafting zones 1 and 2
$T_d,\ T_{d1},\ T_{d2}$	dead (transport) times
T_H	time constant of transfer element G_4
$T_{\overline{H}}$	time constant of transfer element G_7
T_h	time constant of transfer element G_9
$T_{K1},\ T_{K2}$	time constants of transfer element G_{12}
T_U	time constant of transfer elements G_{13}, G_{14}
T_e	temperature of melt from extruder
T_f	temperature of filament
T_g	glass transition temperature
T_g	temperature of glass melt
T_{gm}	temperature of glass melt, mean value
ΔT_g	temperature change of glass melt
$\widehat{\Delta T_g}$	sinusoidal temperature change of glass melt
T_h	temperature of heat medium
T_{hg}	temperature of heated godet
T_m	melt temperature

continuation

Symbol	*Description*
T_{D}	twist density
T_{Dm}	twist density, mean value
ΔT_{D}	twist density change
$\widetilde{\Delta T_{\mathrm{D}}}$	sinusoidal twist density change
$\dot{T}_{\mathrm{D}}$	derivative of T_{D} to t
T_{P}	cycle duration
T_{P1}	cycle duration, correlating to circuit frequency ω_1
T_{P2}	cycle duration, correlating to circuit frequency ω_2
T_{r}	temperature of cool medium
T_{s}	temperature of the spinneret
T_{sm}	temperature of the spinneret, mean value
$\Delta T_{\mathrm{s}},\ \Delta T_{\mathrm{s1}},\ \Delta T_{\mathrm{s2}}$	temperature changes of the spinneret
$\widetilde{\Delta T_{\mathrm{s}}}$	sinusoidal temperature change of the spinneret
T_{y}	temperature of fibre/yarn/thread
T_{ym}	temperature of fibre/yarn/thread, mean value
ΔT_{y}	temperature change of fibre/yarn/thread
TN	tenacity of fibre/yarn/thread
Tt	fineness (titre) of fibre/yarn/thread
Tt_{m}	fineness (titre) of fibre/yarn/thread, mean value
ΔTt	fineness (titre) change of fibre/yarn/thread
$\widetilde{\Delta Tt}$	sinusoidal fineness (titre) change of fibre/yarn/thread
Tt_{f}	fineness of single fibre
Tt_{fm}	fineness of single fibre, mean value
ΔTt_{f}	fineness change of single fibre
$\widetilde{\Delta Tt_{\mathrm{f}}}$	sinusoidal fineness change of single fibre
Tt_{i}	fineness of input fibre/yarn/thread
Tt_{ii}	fineness of input fibre/yarn/thread before the i^{th} elongation step
Tt_{im}	fineness of input fibre/yarn/thread, mean value
Tt_{o}	fineness of output fibre/yarn/thread
Tt_{om}	fineness of output fibre/yarn/thread, mean value
ΔTt_{o}	fineness change of output fibre/yarn/thread
$\widetilde{\Delta Tt_{\mathrm{o}}}$	sinusoidal fineness change of output fibre/yarn/thread
$\dot{T}t_{\mathrm{o}}$	derivative of Tt_{o} to t
$\dot{T}t_{\mathrm{om}}$	derivative of Tt_{om} to t
$\Delta\dot{T}t_{\mathrm{o}}$	derivative of ΔTt_{o} to t
$\widetilde{\Delta Tt_{\mathrm{o}}}(\omega)$	vector of sinusoidal disturbances of the effect variable Tt_{o} for ω
$Tt_{\mathrm{o}}(t)$	fineness of fibre/yarn/thread, time function
Tt_{om}	mean value of $Tt_{\mathrm{o}}(t)$
$Tt_{\mathrm{oi}},\ Tt_{\mathrm{o(i+k)}}$	discontinuous values of time function $Tt_{\mathrm{o}}(t)$

continuation

Symbol	*Description*
Tt_{oi}	fineness of output fibre/yarn/thread after the i^{th} elongation step
Tt_0	fineness of unloaded fibre/yarn/thread
$Tt_{0\mathrm{m}}$	fineness of unloaded fibre/yarn/thread, mean value
ΔTt_0	fineness change of unloaded fibre/yarn/thread
Tt_1	fineness of F loaded fibre/yarn/thread
$Tt_{1\mathrm{m}}$	fineness of loaded fibre/yarn/thread, mean value
ΔTt_1	fineness change of loaded fibre/yarn/thread
Tt_{L}	filament fineness at take-up distance L
Tt_{s}	fineness of ready formated fibre
Tt_{sm}	fineness of ready formated fibre, mean value
$\Delta Tt_{\mathrm{s}},\ \Delta Tt_{\mathrm{s1}},\ \Delta Tt_{\mathrm{s2}}$	fineness changes of ready formated fibre
$\widetilde{\Delta Tt_{\mathrm{s}}}$	sinusoidal fineness change of ready formated fibre
$\dot{T}t_{\mathrm{s}}$	derivative of Tt_{s} to t
Tt_{z}	sliver fineness at output/input of drafting zones 1/2
Tt_{zm}	sliver fineness at output/input of drafting zones 1/2 or fineness of the tensionless fibre/yarn/thread or fibre/yarn/thread fineness of dead time line input, mean values
ΔTt_{z}	sliver fineness change at output/input of drafting zones 1/2 or fibre/yarn/thread fineness change of dead time line input
U^*	activation energy for segment motion
U_{h}	heating voltage
U_{hm}	heating voltage, mean value
ΔU_{h}	heating voltage change
$\widetilde{\Delta U_{\mathrm{h}}}$	sinusoidal heating voltage change
U_{m}	mains voltage
ΔU_{m}	mains voltage change
$\widetilde{\Delta U_{\mathrm{m}}}$	sinusoidal mains voltage change
V	draft of sliver
V_1	draft of sliver drafting zone 1
V_2	draft of sliver drafting zone 2
W	width of filament bundle in multifilament spinning, perpendicular to quenching direction
W_{a}	abbreviation factor in Eq. 5.56
X_{c}	crystallinity

continuation

Symbol	*Description*
α	heat transfer coefficient
α_1	heat transfer coefficient thread/metallic surface
α_2	heat transfer coefficient thread/surrounding air
α_{rt}	resistance-temperature coefficient of the Pt-Rh-spinneret oven
α	angle of wrap
α_{m}	angle of wrap, mean value
$\Delta\alpha$	angle of wrap change
β	parameter (to force density) in multifilament theory
γ	parameter (to force density) in multifilament theory
Δn	(total) birefringence
Δn_{am}	amorphous birefringence
Δn_{cr}	crystalline birefringence
Δ_{i}	birefringence of input fibre/yarn/thread
Δ_{o}	birefringence of output fibre/yarn/thread
$\frac{\partial}{\partial x}, \frac{\partial}{\partial y}$	derivatives in partial DEs
$\frac{\partial}{\partial z}, \frac{\partial}{\partial t}$	derivatives in partial DEs
$\frac{\partial \Phi}{\partial v_{\mathrm{s}}}, \frac{\partial \Phi}{\partial v_{\mathrm{i}}}, \frac{\partial \Phi}{\partial l}$	partial derivatives from Φ to the appropriate sizes
$\frac{\partial \Phi}{\partial q_{\mathrm{s}}}, \frac{\partial \Phi}{\partial q_{\mathrm{i}}}, \frac{\partial \Phi}{\partial \varrho}$	partial derivatives from Φ to the appropriate sizes
$\frac{\partial \Phi}{\partial T_{\mathrm{D}}}, \frac{\partial \Phi}{\partial n_{\mathrm{s}}}, \frac{\partial \Phi}{\partial \mu}$	partial derivatives from Φ to the appropriate sizes
$\frac{\partial \Phi}{\partial v_{\mathrm{z}}}, \frac{\partial \Phi}{\partial v_{\mathrm{o}}}, \frac{\partial \Phi}{\partial T t}$	partial derivatives from Φ to the appropriate sizes
ϵ, ε	elongation of fibre/yarn/thread (in %, resp. logarithmic (HENCKY) measure)
$\Delta\epsilon$	elongation change of fibre/yarn/thread (in %)
ϵ_{b}	elongation at break of fibre/yarn/thread (in %)
ε_{o}	elastic (orientational) part of elongational deformation (HENCKY measure)

continuation

Symbol	*Description*
ε_{oi}	reached orientation elongation of fibre/yarn/thread in the i^{th} elongation step (HENCKY measure)
ε_{o1}	reached orientation elongation of fibre/yarn/thread at the glass transition point (HENCKY measure)
$\Delta\varepsilon_{o1}$	reached orientation elongation change of fibre/yarn/thread at the glass transition point (HENCKY measure)
ε_{omax}	maximum orientation elongation of fibre/yarn/thread (HENCKY measure)
ε_v	viscous part of elongational deformation (HENCKY measure)
$\dot{\varepsilon}_v$	viscous elongational deformation rate (HENCKY measure)
$\varepsilon(t)$	elongation of fibre/yarn/thread, time function
$\epsilon_1,\ \epsilon_2$	elongations (in %) correlated with F_1 and F_2
ε_m	emissivity (heat radiation)
η	elongational viscosity
η_{app}	apparent elongational viscosity
η_{air}	dynamic viscosity of air
η_e	viscosity of melt from extruder
η_s	viscosity of melt in the spinneret
η_h	heating yield
θ	angle
λ	relaxation time
λ_{air}	heat conductivity of air
λ_f	wavelength of disturbance
λ_i	wavelength of disturbance effect in an input web
λ_o	wavelength of disturbance effect in an output web
μ	coefficient of friction between fibre/yarn/thread and fixed friction guide or false twist spindle
μ_m	coefficient of friction between fibre/yarn/thread and fixed friction guide or false twist spindle, mean values
$\Delta\mu$	change of coefficient of friction between fibre/yarn/thread and fixed friction guide or false twist spindle
$\widetilde{\Delta\mu}$	sinusoidal change of coefficient of friction between fibre/yarn/thread and fixed friction guide or false twist spindle

continuation

Symbol	*Description*
ν_{air}	kinematic viscosity of air
ϱ_{air}	density of air
ϱ	density of polymer or thread material
ϱ_{m}	density of polymer, mean value
$\Delta\varrho$	density change of polymer
$\widetilde{\Delta\varrho}$	sinusoidal density change of polymer
ϱ_{am}	mass density of amorphous polymer
ϱ_{cr}	mass density of crystalline polymer
ϱ_{m}	mass density of glass
ϱ_{p}	mass density of polymer
σ	filament stress
$\sigma(t)$	fineness related tensile force of fibre/yarn/thread, time function
σ_{m}	mean value of $\sigma(t)$
$\sigma_{\mathrm{i+k}}$	discontinuous value of time function $\sigma(t)$
$\sigma_{\mathrm{T_g}}$	tension $F_{\mathrm{T_g}}/Tt_{\mathrm{s}}$ of fibre/yarn/thread at the glass transition point
σ_{SB}	STEPHAN-BOLTZMANN constant
σ_{surf}	surface tension (specific surface energy)
τ	time shift (correlation function)
τ_{f}	shear stress at filament surface
φ	phase shift angle
φ_{a}	humidity of quenching air
φ_1	phase shift angle, correlating to circuit frequency ω_1
φ_2	phase shift angle, correlating to circuit frequency ω_2
φ_3	phase shift angle, correlating to circuit frequency ω_3
$\varphi(\omega), \quad \varphi(f)$	phase frequency responses
Φ	fluidity
Φ	symbol for a nonlinear differential equation
$\Phi(x, r)$	potential flow function, radial coordinates
$\Psi(x, y)$	potential flow function, cartesian coordinates
ω	circular/excitation frequency
ω_0	circular/excitation frequency, level 0
ω_1	circular/excitation frequency, level 1
ω_2	circular/excitation frequency, level 2

continuation

Symbol	*Description*
ω_3	circular/excitation frequency, level 3
ω_c	critical (circular) frequency
$\sqcup\!\!\sqcap$	step
$\perp$	impulse

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