

"The Sheet Forming Process"

by J. P. Parker

A Project of the Fluid Mechanics Committee

1972. 104 pp., 6" x 8" soft cover
Item Number: 0102BS09

This classic text defines the basic process mechanisms by which fibers are manipulated to yield the characteristic structure of paper. Chapter One, titled The Basic Forming Process: A Composite Three hydrodynamic Processes, features three sections: Drainage, Oriented Shear, Turbulence. Chapter Two, titled Practical Applications, has four sections: Fourdrinier Machines, Roll Formers, Two-Wire Formers, and Cylinder-Vat Machines. The book also contains references and a subject index.

Table of Contents

Preface

Chapter 1. The Basic Forming Process:
a Composite of Three Hydrodynamic
Processes

Drainage

Filtration vs Thickening

Fiber Retention

Mat Compaction

"Fines" Retention

Oriented Shear

Orienting Effect

Concentrating Effect

Dispersing Effect

Turbulence

Structure of Fiber Networks in

Suspension

Turbulent Dispersion of Fiber

Networks

Direct Observations

Turbulent Flow Behavior

The Role of Turbulence in the

Forming Process

Chapter 2. Practical Applications

Fourdrinier Machines

Roll Formers

Two-Wire Formers

Cylinder-Vat Machines

References

"The Sheet Forming Process"

by J. P. Parker

<p>Subject Index</p> <p>Ash distribution fourdrineir machine coating raw stock sheets twin-wire former coating raw stock sheets</p> <p>Basis weigh distribution large-scale, improvement of</p> <p>Coherent network formation in</p> <p>Collection efficiency discharge velocity, effect of fiber diameter, effect of</p> <p>Compacting force gradient porosity, effect on</p> <p>Concave wall flow Taylor-Geoertle vortices in,</p> <p>Concentrating effect</p> <p>Concentration shear modulus, effect on</p> <p>Shear strength, effect on</p> <p>Consistency filtration resistance, effect on porosity, effect on dilution and turbulence, effect off</p> <p>Fiber networks bonding forces, source</p>	<p>shear strength, effect on</p> <p>Corrugating medium sheet formation</p> <p>Critical concentration</p> <p>Curl fiber orientation, effect of</p> <p>Cylinder-vat machines basis weight buildup counterflow type disadvantages economic advantages low-speed operation modified properties, variations in</p> <p>sheet formation uniflow type</p> <p>Dandy roll dispersing effect flow behavior at sheet compaction effect on speed, effect on two-sidedness, effect on</p> <p>D'Arcy equation</p> <p>Discharge jet turbulence, degree of</p> <p>Dispersing effect</p> <p>Drainage fiber flocs, effect on filtration vs. thickening mat rupture, effect on</p> <p>Drainage flow of dispersion shear modulus stress strain curves</p>	<p>velocity decreasing porosity, increase with</p> <p>Drainage foils flow disturbances table rolls, comparison of suction profiles over</p> <p>Drainage rate turbulence effect of</p> <p>Drainage resistance increase in</p> <p>Eddy scales turbulence effect of</p> <p>Eddy stretching</p> <p>Elastoviscometer network strength, measurement of</p> <p>Fiber deposition mechanisms by drainage</p> <p>Fiber dispersion flow rate, effect of table rolls and foils, generation by</p> <p>Fiber distribution large scale small scale</p> <p>Fiber flocculation mechanism</p> <p>Fiber flocs drainage effect of</p> <p>Fiber length network formation, effect on</p> <p>Fiber mobility structure tensile strength turbulence effect of turbulent dispersion</p>
--	--	---

"The Sheet Forming Process"

by J. P. Parker

Fiber orientation
curl effect on
fourdrinier newsprint
paper directionality
effect
on
turbulence effect of
twin wire process
Fiber orientation pattern
drainage and oriented
shear
interaction between
Fiber retention
mathematical
expression for
porosity effect of
probability relation to
interwire spacing
Fiber stiffness
shear modulus, effect
of
Fiber suspension
friction factor curves
friction loss data
Network shear
strength
normalization with
pipe flow
plug flow
plug regime
Turbulence
mechanism
Fibers
random distribution
Fibrous mats
static compressibility
Filler
handsheet, distribution
in
Filtration
theory
vs. thickening in
drainage
Filtration resistance
consistency effect of
Fines
concentration
redistribution
Fines retention
basis weight effect on
wire side
reduced on
Floc formation
turbulence effect of
Floc shapes
turbulent flow
Floc size
flow velocity effect of
shear rate, effect of
Flocs
lifetime
Forming roll nip
backflow pond in
fourdrinier machines
twin wire formers,
comparison of
Fourdrinier newsprint
fiber orientation
Fourdrinier table
transverse shake
Fourdrinier wire
slice jet discharge,
difference in
velocity between
Fourdrinier wire mesh
effect of
Fourdrinier wire shake
CD oriented shear
Free particles
diffusion rate
Free surface instabilities
Friction factor
Friction factor curves
fiber suspensions
Friction loss
fiber suspensions
Glassine paper
sheet formation
Greaseproof paper
sheet formation
Groundwood book
paper
sheet formation of
Handsheets
formation at different
drainage rates
Headbox discharge
discrete vortices
source of
Headbox discharge jet
stable vortices in
Headbox jets
random turbulence
application of
Hydrodynamic
flocculation
Hydrodynamic
processes
Individual fibers
rotational movements
Inertial effects
Intensity
turbulence relation to
Interfiber cohesion
colloidal
mechanical
Inverform
Jet impingement
Karma-Prandtl equation
Kozen-Carman analysis
Draft bag paper
sheet formation of
Kraft linerboard
sheet formation
Layered sheet
Macrodiffusion
Mat compacting force
drainage flow
direction, increase in
Mat concentration
porosity, relation to
MD fiber alignment
oriented shear effect
of
Microdiffusion
Mixed flow regime
Multi-ply board
roll formers for
Network formation
fiber length effect of
Network strength
elastoviscometer,
measurement with
Networks
fibers immobilization
of
Newsprint
groundwood and
chemical pulp
distribution of

"The Sheet Forming Process"

by J. P. Parker

Oriented shear
fiber network
dispersion
effect on
fiber orientation cause
of
fourdrinier wire shake
mat rupture, effect on
MD fiber alignment
effect on
Network structure,
dispersion of
pattern
shear flow
turbulence, relation to

Paper directionality
fiber orientation effect
of
Papriformer machine
fiber orientation
reduced
Plug breakdown
shear stress effect of
Plug flow regime
Porosity
applied pressure
relation
to
compacting force
gradient
effect of
consistency effect of
Fiber retention effect
on
mat concentration
Specific filtration
resistance
handsheet unfilled
Static compressibility
fiber diameter effect of
fiber length effect of
Stevens former
Stochastic effect
Stress strain curves
fiber networks
Suction flatboxes

Table roll dispersion
Table rolls
drainage foil,
comparison of suction
profiles over

concentrating effect of
relation to
pressure gradient
relation to
Post roll spouting
Pressure gradient
porosity relation of
Printing paper
wire mark intensity

Random turbulence
headbox jets,
applications to
Reynolds number
Roll formers
advantages
disadvantages
higher machine speed
increased drainage
increased turbulence
MD oriented shear
Multi ply boards
space saving
tissue
uniform flow
Rotoformer

Scale
turbulence, relation to
Sedimentation
concentration
flocculation effect of
Shake
sheet formation effect
on
Sheer module
drainage rate by
suction
flow disturbances
free surface profiles
over
modification
pressure over
sheet effect on
Taylor-Goertler vortices
Thickening
vs. filtration in
drainage
Tissue
roll formers for
Transition points
fiber suspension flow
Turbulence

concentration effect of
fiber networks
fiber stiffness increase
with
Shear strength
concentration effect of
consistency variation
with
groundwood sulfite
mixture
Shear stress
plug breakdown effect
on
Sheet formation
conditions for
corrugating medium
dandy roll, effect of
fiber orientation effect
of
glassine paper
greasproof paper
groundwood book
paper
jetwire velocity
difference, effect of
kraft bag paper
kraft linerboard
shake effect of
two dimensional
pattern
wrapping
Sheet structure
filtration effect of
Sheet uniformity
fiber flocs effect of
devices fro generating
drainage rate, effect
on
eddy scales, effect on
fiber networks effect
on
fiber orientation effect
on
floc formation effect on
mat rupture effect on
neutralizing effect of
oriented shear relation
to
radioactively tagged
fibbers
study with
shear flow

"The Sheet Forming Process" by J. P. Parker

Turbulent diffusion
Turbulent flow
 fiber dispersion
 fiber suspensions
 frequency analysis
Twinverfrom machine
Twin wire formers
 fourdrinier machine,
 comparison with
 free surface
elimination
 improved print quality
 improved wire mark
 multi ply boards
 symmetrical drainage
 uniform stock metering
Twin wire nips
 backflow patterns in
Twin wire process
 fiber orientation

Velocity profiles
 fiber suspensions
Verti forma machine
Vortex filaments,
interaction
 of
Vortex flow

Wet suction boxes
 fines retention
increase in
wire mark intensity
 consistency effect of
 initial drainage rate
effect of
Wrapping paper, sheet
 formation of