APPENDIX E

Limited Glossary of Selected Terms

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Accuracy
Degree of conformity of a measure to a standard or true value.

Active bed (layer)
The active bed is a simplifying concept used in mobile boundary models. The layer of material between the bed surface and a hypothetical depth at which no transport will occur for the given gradation of bed material and flow conditions. See Fig. E-1.

Adjustment
Variation of the parameters in a model to ensure close reproduction of a set of prototype conditions by the model.

Aggradation
The process by which stream beds, floodplains, and the bottoms of other water bodies are raised in elevation by the deposition of material eroded and transported from other areas. It is the opposite of degradation.

Algorithm
A procedure for solving a mathematical problem in a finite number of steps that frequently involves repetition of an operation. A step-by-step procedure for solving a problem or accomplishing an end. A set of numerical steps or routines to obtain a numerical output from a numerical input.

Alluvial
Pertains to alluvium deposited by a stream or flowing water.

Alluvial fan
A conical or fan-shaped deposit at the base of a mountain range where the mountain stream encounters the lesser slope of the valley floor. The deposits are generally coarse, alluvial fans most often occur in arid and semiarid regions where streamflow is ephemeral and vegetation cover is sparse.

Alluvial reach
A reach of river with a sediment bed composed of the same type of sediment material as that moving in the stream.

Alluvial stream
A stream whose channel boundary is composed of alluvium, and which generally changes its cross section and bed form due to the interaction of the flow and mobile boundary adjustment.

Alluvium
A general term for detrital deposits made by (modern) streams on riverbeds, floodplains, and alluvial fans.

Alternate bars
Bars formed in a staggered pattern near the banks of channels. See Fig. E-2.

Analytical model
Mathematical model in which the solution of the governing equations is obtained by algebraic analysis.

Anomaly
(1) A departure from the expected or normal. (2) A geological feature, esp. in the subsurface, distinguished by geological, geophysical, or geochemical means, which is different from the general surroundings and is often of potential value.

Armor layer
See **Armoring**.

Armoring
The process of progressive coarsening of the bed layer by removal of fine particles until it becomes resistant to scour. The coarse layer that remains on the surface is termed the "armor layer." Armoring is a temporary condition; higher flows may destroy an armor layer and it may reform as flows decrease. Or, simply, the formation of a resistant layer of relatively large particles resulting from removal of finer particles by erosion.

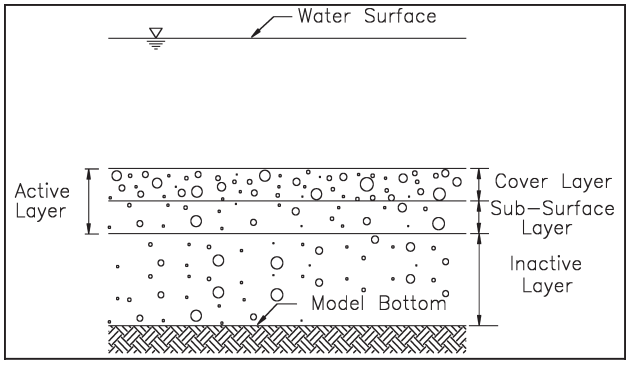

Fig. E-1. Composition of the active layer.

Average end method
The averaging of the two end cross sections of a reach in order to smooth the numerical results.

Avulsion
A rapid change in channel location and form that occurs during severe floods.

Backwater curve
Concave-upward longitudinal profile of the water surface in a stream where the water surface is raised above its normal level by a natural or artificial obstruction.

Bank migration
Lateral shifting of the banks of a streamcourse.

Bank sediment reservoir
A hypothetical reservoir of sediment specified in some mobile boundary models to accommodate vertical bed adjustment due to sour and deposition. See Fig. E-3.

Bed forms
Wave-like irregularities found on the bottom (bed) of a stream that are related to flow characteristics. They are given names such as "dunes," "ripples," and "antidunes." They are related to the transport of sediment and they interact with the flow because they change the roughness of the stream bed. An analog to stream bed forms is desert sand dunes.

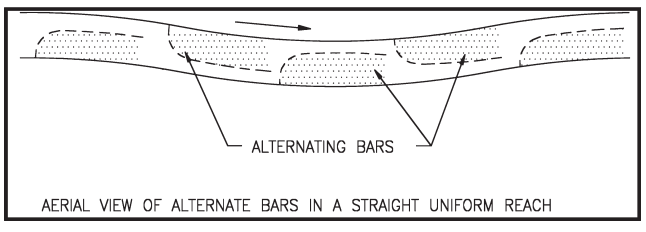

Fig. E-2. Alternate bars.

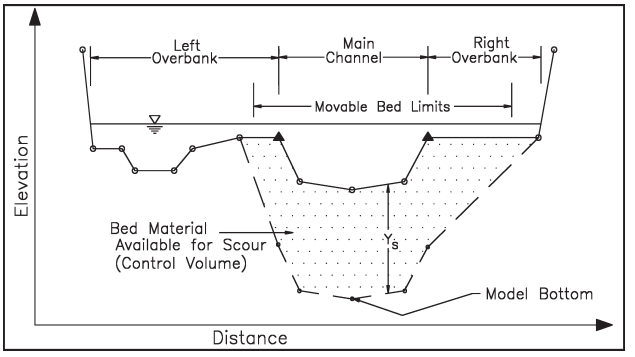

Fig. E-3. Components of the streambed as depicted in some mobile boundary models.

Bed layer
An arbitrary term used in various procedures for computation of sediment transport. From observation of slow-motion movies of laboratory flume experiments, H. Einstein defined the "bed layer" as "A flow layer, 2 grain diameters thick, immediately above the bed. The thickness of the bed layer varies with the particle size."

Bed load
Material moving on or near the stream bed by rolling, sliding, and sometimes making brief excursions into the flow a few diameters above the bed, i.e., jumping. The term "saltation" is sometimes used in place of "jumping." Bed load is bed material that moves in continuous contact with the bed; contrast with **Suspended load**.

Bed-load discharge
The quantity of bed load passing a cross section in a unit of time. Usually presented in units of tons per day. May be measured or computed. See **Bed load**.

Bed material
The sediment mixture of which the bed is composed. In alluvial streams, bed-material particles are liable to be moved at any moment or during some future flow condition. Bed material may include grain sizes that travel both as bed load and suspended load. Contrast with **Wash load**.

Bed material load
The total rate at which bed material is transported by a given flow at a given location on a stream. It consists of bed material moving both as bed load and suspended load. Contrast with **Wash load**.

Bed or **hydraulic sorting**
See **Sorting**.

Bedrock
A general term for erosion resistant, consolidated material that underlies soil or other unconsolidated superficial material.

Bias
A systematic error introduced into sampling or testing by selecting or encouraging one outcome or answer over others. Bias can be introduced by setting variables or factors which would result in one outcome.

Boundary conditions
Definitions or statements of conditions or phenomena at spatial or temporal boundaries of a model. Water levels, flows, sediment concentrations, etc., that are specified at the boundaries of the area being modeled. A specified tailwater elevation and incoming upstream discharge are typical boundary conditions.

Boundary effect
Consequence of dissimilarities between the model boundary conditions and the conditions occurring in the prototype at the location of the model boundaries.

Boundary roughness
A measure of hydraulic resistance in a stream or river or floodplain. The greater the roughness, the greater the frictional resistance to flows; and, hence, the higher the water-surface elevation for any given discharge.

Braided channel
A stream that is characterized by random interconnected channels divided by islands or bars. Bars that divide the stream into separate channels at low flow are often submerged at high flow.

Calibration
Adjustment of a model's parameters such as roughness or dispersion coefficients so that it reproduces observed prototype data to acceptable accuracy.

Channel
A natural or artificial waterway that periodically or continuously contains moving water.

Channel invert
The lowest point in the channel at a given cross section.

Characteristics method
Numerical method in which the governing partial differential equations of a mathematical model are transformed into characteristic (ordinary differential) equations.

Clay
See Table E-1.

Table E-1 Scale for Size Classification of Sediment Particles[a]

Class name	Millimeters	Feet	PHI value
Boulders	>256	—	< −8
Cobbles	256–64	—	−8 to −6
Very coarse gravel	64–32	0.148596	−6 to −5
Coarse gravel	32–16	0.074216	−5 to −4
Medium gravel	16–8	0.037120	−4 to −3
Fine gravel	8–4	0.018560	−3 to −2
Very fine gravel	4–2	0.009279	−2 to −1
Very coarse sand	2.0–1.0	0.004639	−1 to 0
Coarse sand	1.0–0.50	0.002319	0 to +1
Medium sand	0.50–0.25	0.001160	+1 to +2
Fine sand	0.25–0.125	0.000580	+2 to +3
Very fine sand	0.125–0.0625	0.000288	+3 to +4
Coarse silt	0.0625–0.031	0.000144	+4 to +5
Medium silt	0.031–0.016	0.000072	+5 to +6
Fine silt	0.016–0.008	0.000036	+6 to +7
Very fine silt	0.008–0.004	0.000018	+7 to +8
Coarse clay	0.004–0.0020	0.000009	+8 to +9
Medium clay	0.0020–0.0010	—	+9 to +10
Fine clay	0.0010–0.0005	—	+10 to +11
Very fine clay	0.0005–0.00024	—	+11 to +12
Colloids	<0.00024	—	> +12

[a]Portions of Table E-1 are taken from Corps of Engineers *EM 1110-2-4000,* March 1988.

Cobbles
See Table E-1.

Cohesive sediments
Sediments whose resistance to initial movement or erosion is caused mostly by cohesive bonds between particles.

Computational hydrograph
A sequence of discrete steady flows, each having a specified duration in days, used to represent a continuous discharge hydrograph. See Fig. E-4.

Concentration of sediment
The dry weight of sediment per unit volume of water-sediment mixture.

Conceptual model
A simplification of prototype behavior used to illustrate functional relationships.

Confirmation
Process in which a model of a specific study area is built and tested to prove that the model design and implementation are adequate and no major phenomenon has been overlooked.

Consistency
The property of a numerical solution to a set of partial differential equations that, as time and distance steps are decreased, the difference equations approach the differential equations.

Consolidation
The compaction of deposited sediments caused by grain reorientation and by the squeezing water out of the pores.

Control point
Term used in river modeling to describe the downstream boundary of the main river segment and the junction point of each tributary. In Fig. E-5, each control point is designated by a circled number.

Convergence
The state of tending to a unique solution. A given scheme is convergent if an increasingly finer computational grid leads to a more accurate solution.

Conveyance
A measure of the flow capacity of a channel section. Flow is directly proportional to conveyance for steady uniform flow. From Manning's equation, the proportionality factor is the square root of the energy slope.

Cover layer
One of the two sublayers of the active layer. It lies above the subsurface layer (the second sublayer in the active layer). See Fig. E-1.

Critical depth
If discharge is held constant and the water depth allowed to decrease, as in the case of water approaching a free overfall, velocity head will increase, pressure head will decrease, and total energy will decrease toward a minimum value where the rate of decrease in the pressure head is just balanced by the rate of increase in velocity head. This is the critical depth. More generally, the critical depth is the depth of flow that would produce the minimum total energy head and a Froude number equal to one (1).

Critical flow
The state of flow where the water depth is at the critical depth.

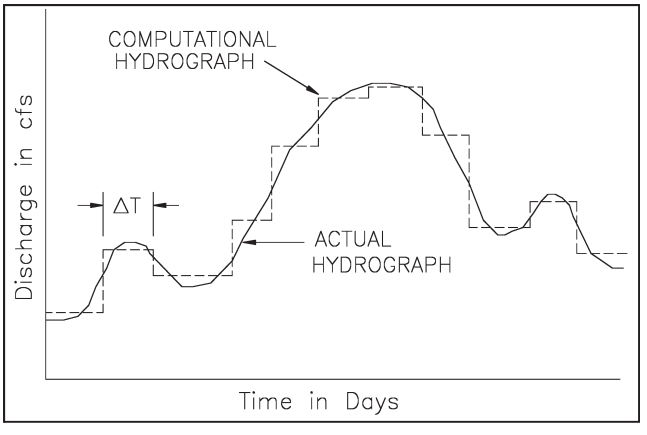

Fig. E-4. Computational hydrograph.

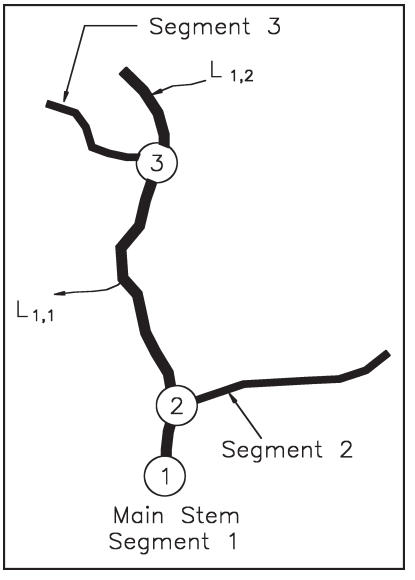

Fig. E-5. Example of segment and control point numbering for a river system.

Critical shear stress
The minimum amount of shear stress exerted by passing stream currents required to initiate soil particle motion.

Cross section
The shape of the channel in which a stream flows on a line perpendicular to the flow or banks.

Cross-sectional area
The wetted area of a cross section perpendicular to the direction of flow.

Degradation
The process by which stream beds, floodplains, and the bottoms of other water bodies are lowered in elevation by erosion of material. It is the opposite of aggradation.

Delta
A fan-shaped deposit of sediment formed where moving water (as from a stream at its mouth) enters a body of standing water and deposits a portion of its sediment load.

Density
The mass of a substance per unit volume. The Greek letter ρ is the common symbol.

Density (turbidity) current
A mixture of water and fine-grained sediment that flows into and along the bottom of a reservoir or other static body of water because its density is greater than that of the standing water in the reservoir.

Deposition
The mechanical or chemical processes through which sediments accumulate in a (temporary) resting place.

Depth of flow
The vertical distance from the bed of a stream to the water surface.

Deterministic model
Mathematical model in which the behavior of every variable is completely determined by the governing equations and the initial states of the variables.

Digitize
To convert data from maps or graphical form to digital form for use by computer programs.

Dimensionless number
A physically meaningful relationship of parameters that is dimensionless. These dimensionless relationships are useful in determining scaling laws because a particular dimensionless number should be the same in both model and prototype to achieve complete similarity. Examples are the common force ratios, such as the Froude and Reynolds numbers.

Discharge
The discharge *(Q)* is the volume of a fluid or solid passing a cross section of a stream per unit time.

Discretization
The procedure of representing a continuous variable by discrete values at specified points in space and/or time.

Discretization error
Error introduced by the discrete representation of a continuous variable.

Distorted model
Physical hydraulic model in which horizontal and vertical scales are different.

Distortion
Intentional departure from a scaling law often necessitated by a complex set of prototype and laboratory conditions. The term is most commonly used for geometric distortion in physical models where the vertical and horizontal scales of the model are different.

Distributaries
Diverging channels that do not return to the main stream, but discharge into another stream system or the ocean.

Dominant discharge
The "dominant or effective discharge" is associated with the peak of cumulative sediment transport for a given streamflow magnitude and frequency of occurrence. It is the discharge that is generally doing the work (sediment transport) that results in the average morphologic characteristics of alluvial channels.

Draft (depth)
The depth measured perpendicularly from the water surface to the bottom of a boat or ship. Clearance depth.

Drainage basin
The area tributary to or draining into a lake, stream, or measuring site. See **Watershed**.

Drop
A structure in an open conduit or canal installed for the purpose of dropping the water to a lower level and dissipating its energy. It may be vertical or inclined; in the latter case it is usually called a chute.

Dunes
Bed forms with triangular profile that advance downstream due to net deposition of particles on the steep downstream

slope. Dunes move downstream at velocities that are small relative to the streamflow velocity.

Dynamic model
A mathematical model of flow in an open channel that solves the complete unsteady-flow equations (Saint-Venant equations for one-dimensional problems).

Effective (grain) size
The effective grain size is that single particle diameter that best depicts the bed-material properties. The D50 grain size is often used as the effective grain size.

Empirical model
Representation of a real system by a mathematical description based on experimental or observed data rather than on general physical laws.

Entrainment
The process of picking up and carrying into the flow of bed material produced by erosive action and turbulence of moving water.

Equilibrium load
The amount of sediment that a river channel system can carry for a given discharge without overall accumulation (deposition) or scour (degradation).

Erosion
The wearing away of the land surface or stream boundaries by detachment and movement of soil and rock fragments through the action of moving water or other geological agents.

Explicit scheme
A numerical approximation scheme in which the governing equations of a numerical model are arranged to update the dependent variables in terms of previously known values only. Compare with **Implicit scheme**.

Fall velocity
The falling or settling rate of a particle in a given fluid or gaseous medium.

Finite element method
Method of solving the governing equations of a numerical model by dividing the spatial domain into elements in each of which the solution of the governing equations is approximated by some continuous function.

Fixed-bed model
Type of model (a simplification) in which the bed and bank materials are nonerodible and deposition does not occur either.

Floodplain
Normally dry land adjacent to a body of water which is susceptible to periodic inundation by floodwaters.

Flood routing
The process of tracing, by calculation, the height and discharge of a flood as it progresses through a river reach or a reservoir.

Flow duration curve
A measure of the range and variability of a stream's flow. The flow duration curve represents the percent of time during which specified flow rates are exceeded at a given location. This is usually presented as a graph of flow rate (discharge) versus percent of time that flows are greater than, or equal to, that flow.

Fluvial
(1) Pertaining to streams. (2) Growing or living in streams or ponds. (3) Produced by river action, as a fluvial plain.

Fluvial sediment
Particles derived from rocks or biological materials that are transported by, suspended in, or deposited by streams.

Frequency
The number of repetitions of a periodic process in a certain time period.

Froude number
$U/(g{\cdot}L)^{1/2}$ (U = velocity, g = gravity, L = length). A dimensionless number expressing the ratio between the influences of inertia and gravity in a fluid. The Froude number is primarily related to surface phenomena in flowing water.

Froude number model (or **Gravitational model**)
Model designed to emphasize similarity of gravitational and inertial forces (Froude number). Other forces, such as viscous (Reynolds number) forces, may not be reproduced correctly.

Gauging station
Location in a stream channel where discharge and other parameters are measured continuously or periodically.

Geologic control
A local rock formation or scour-resistant layer that limits (within the engineering time frame) the vertical and/or lateral movement of a stream at a particular point. Man-made controls such as drop structures also exist.

Geology
The science that deals with the physical history and state of the earth, especially as recorded in rocks and landforms.

Geomorphology
The science that considers the processes that contribute to the changing configuration of the earth's surface.

Gradation
The proportion of material of each particle size, or the frequency distribution of various sizes, constituting a particulate material such as a soil, sediment, or sedimentary rock.

Grain shape factor
See **Particle shape factor**.

Grain size
See **Particle size**.

Grain size distribution (gradation)
A measure of the variation in grain (particle) sizes within a mixture. Usually presented as a graph (gradation curve) of grain diameter versus percentage of the mixture that is finer than that diameter. See Fig. E-6.

Gravel
See Table E-1.

Grid
Network of points covering the space or time-space domain of a numerical model. The points may be regularly or irregularly spaced.

Heuristic model
Representation of a real system by a mathematical description based on reasoned, but unproven, argument.

Historic flows
The collection of recorded flow data for a stream during the period of time in which stream gauges were in operation.

Hybrid model
Model combining at least two modeling techniques (e.g., physical and numerical) in a closely coupled fashion.

Hydraulic depth
The ratio of cross-sectional area. A divided by the width of the free surface T at a specific cross-section along the channel.

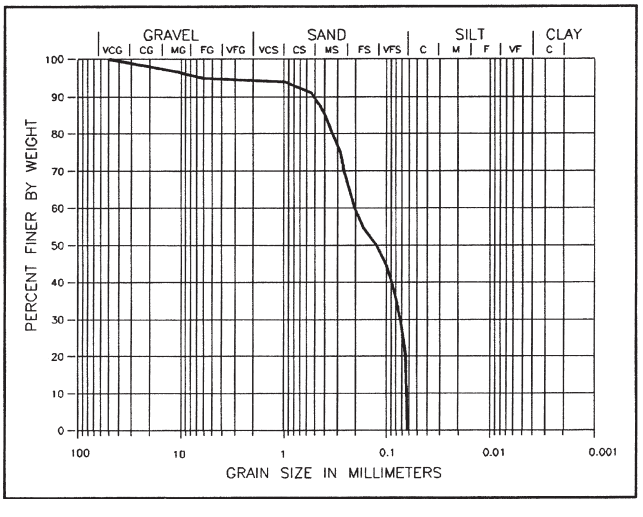

Fig. E-6. Example of a sediment gradation curve.

Hydraulic model
A physical scale model of a river, hydraulic structure, etc. used for engineering studies.

Hydraulic radius
The ratio of cross-sectional area to wetted perimeter at any given elevation.

Hydrograph
The graph of stage or discharge versus time at a specified location along a stream or river.

Implicit scheme
Scheme in which the governing equations of a numerical model are arranged to obtain solutions for the dependent variables simultaneously at all grid points corresponding to any one time. The computed values depend not only on known values at a previous time but also on the other unknown neighboring values at the surrounding grid points at the time being calculated. Compare with **Explicit scheme**.

Impoundment
Body of water formed by blocking flowing water, as at a dam.

Inactive layer
The depth of material beneath the active layer. See Fig. E-1.

Incipient motion
The flow condition at which a given size bed particle just begins to move. Usually related to a "threshold" shear stress.

Initial conditions
The values of water levels, velocities, concentrations, etc., that are specified everywhere in the computational mesh at the beginning of a model run. For an iterative solution, the initial conditions represent the first estimates of the variables the model is trying to solve.

In situ
In (its original) place.

Linear model
Mathematical model based entirely on linear equations.

Local inflow/outflow point
Points along any river segment at which water and sediment enter or exit as specified for modeling purposes. Fig. E-7.

Local scour
Erosion caused by an abrupt change in flow direction or velocity. Examples include erosion around bridge piers, downstream of stilling basins, at the ends of dikes, and near snags.

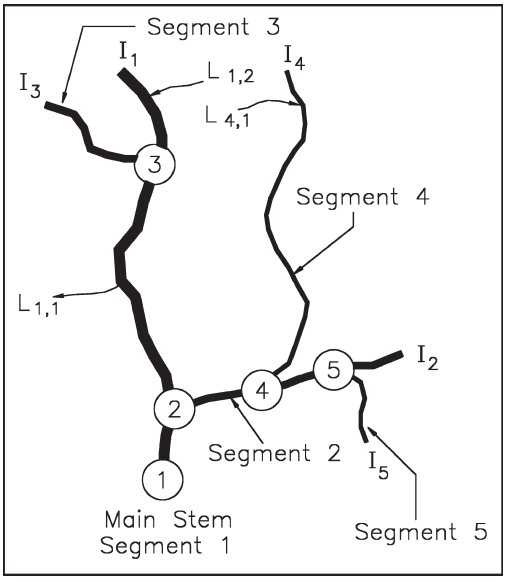

Fig. E-7. Local inflow/outflow points.

Main stem
The primary river segment in the schematization of a river system.

Manning's equation
Empirical equation commonly applied in water-surface profile calculations to define relationships between surface roughness, discharge, flow geometry, and rate of friction loss.

Manning *n* Value
n is the coefficient of roughness with the dimensions of $T \times L^{-1/3}$. *n* accounts for energy loss due to friction. In movable boundary hydraulics, the Manning *n* value includes the effects of all losses, such as grain roughness of the movable bed, form roughness, bank irregularities, vegetation, bend losses, and junction losses. Contraction and expansion losses are usually not included in Manning's *n*, but are typically accounted for separately.

Mathematical model
A model that uses mathematical expressions (i.e., a set of equations, usually based upon fundamental physical principles) to represent a physical process.

Meandering stream
An alluvial stream characterized in planform by a sequence of alternating bends. The bends are usually a result of alluvial processes rather than the nature of the terrain.

Mean velocity
The discharge divided by the wetted area of a cross section.

Movable bed
That portion of a river channel cross section specified in a mobile boundary model that is considered to be subject to erosion or deposition.

Movable bed limits
The lateral limits of a channel used to define where scour or deposition may occur. See Fig. E-3.

Movable bed model
Model in which the bed material is erodible and transported in a manner similar to the prototype; can be a hydraulic or numerical model.

Navigation model
Model used to study maneuverability of vessels under currents, waves, wind, etc., for design of navigable waterways.

Network model
A network model is an arrangement of main stem, tributary, and local inflow/outflow points that can be simulated simultaneously and in which flow and sediment transport can be calculated.

NGVD
National Geodetic Vertical Datum; vertical datum plane of reference.

Node
Location in a numerical network where computations are performed and/or output is requested.

Nonlinear model
Mathematical model based on one or more nonlinear equations.

Normal depth
The depth that would exist or be approached if the flow were uniform.

Numerical experiments
Varying the input data or internal parameters of a numerical model to ascertain the impact on the output.

Numerical model
A numerical model is a representation of a mathematical model as a sequence of instructions (program) for a computer. Given approximate data, the execution of this sequence of instructions yields an approximate solution to the set of equations that compose the mathematical model.

One-dimensional model
Model defined with one space coordinate; usually distance. Variables are averaged over the other two directions (e.g., wave propagation in a narrow channel).

Operating rule
A rule that specifies how water is managed throughout a water resource system. Often defined to include target system states, such as storage, above which one course of action is implemented and below which another course is taken.

Overbank area
In a river reach, the surface area between the bank on the main channel and the outer limits of the floodplain. See Fig. E-8.

Overdredging
Additional depth dredged beyond the minimum dredging depth used to provide sufficient navigational depth, to minimize redredging, and to help compensate for the sloughing off and resettling of sediment after dredging occurs.

Parameter
A constant or variable in a mathematical expression.

Particle shape factor
The particle shape factor of a perfect sphere is 1.0 and can be as low as 0.1 for very irregular shapes. It is defined by

$$\text{SF} = \frac{c}{(a \cdot b)^{1/2}} \tag{E-1}$$

where

a, b, c = the lengths of the longest, intermediate, and shortest, respectively, mutually perpendicular axes on a sediment particle.

Particle size
A linear dimension, usually designated as "diameter," used to characterize the size of a particle.

Permeability
The property of a soil or rock materials that permits the passage of water under a hydraulic gradient.

Phasing
Phasing refers to the timing of flows between the main stem of a river and its tributaries. The arrival of flows into the main stem from the upper watersheds is a function of the size and characteristics of the watersheds, tributary channels, and characteristics of the storm event.

Physical model
Model using the physical properties and behavior of modeling materials to represent the prototype; a three-dimensional scale model of the prototype.

Planform
The shape and size of channel and overbank features as viewed from directly above.

Point bar
Deposits of sediment that occur on the convex side or inside of channel bends. Their shape may vary with changing flow conditions, but they do not move significantly relative to the bends. However, the general magnitude and location of the bars vary with discharge and sediment load. See Fig. E-9.

Probabilistic model
Mathematical model in which the behavior of one or more of the variables is either completely or partially subject to probability laws.

Prototype
The full-sized structure, river system process, or phenomenon being modeled.

Quasi-steady-state model
Model in which time-dependent variables are simulated by a sequence of steady states.

Quasi-three-dimensional model
A combination of two-dimensional models used to simulate variations in three dimensions.

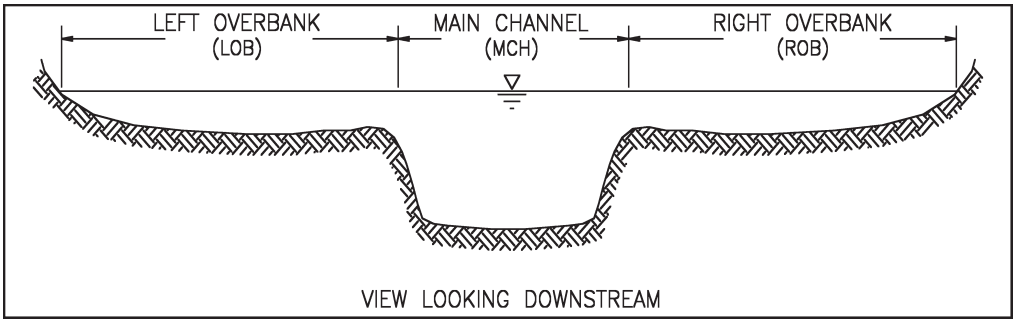

Fig. E-8. Examples of overbanks.

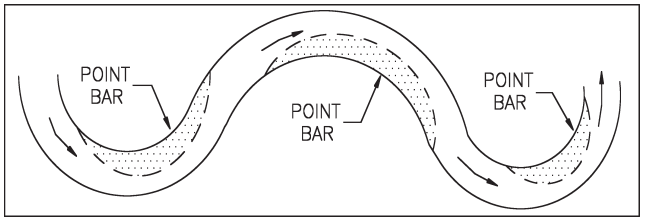

Fig. E-9. View of three-point bars.

Rating curve
See **Stage-discharge curve**.

Reach
(1) A length of a channel that is approximately uniform with respect to discharge, depth, area, and slope; (2) A length of a stream between two specified points.

Reservoir
An impounded body of water or controlled lake.

Reynolds number
$(U \bullet L)/\nu$ Dimensionless ratio of inertial force to viscous force; the length may represent grain size, depth of flow, or pipe diameter, resulting in different Reynolds numbers for different purposes. The critical Reynolds number describes the onset of turbulence. The Reynolds number is defined as velocity multiplied by length divided by kinematic viscosity. It is usually involved wherever viscosity is important, such as in slow movement of fluid in small passages or around small objects.

Roundoff error
Cumulative error introduced by rounding of the results from individual arithmetic operations because only a finite number of digits can be retained after each operation on a digital computer.

Routing
Technique used to compute the effect of channel storage and conveyance on the characteristics of a flood wave moving through a river reach. Also used when describing the movement of sediment volumes through a river system.

Runoff
Surface flow resulting from rainfall that is discharged from a specified area of land sometimes subdivided into direct surface runoff, ground-water runoff, and seepage.

Sand
See Table E-1.

Saturation
The degree to which voids in soil are filled with water.

Scale (or scale ratio)
Ratio of a parameter in a model to the corresponding parameter in the prototype.

Scale effect
Consequence of nonsimilarity between model and prototype resulting from the fact that not all pertinent dimensionless numbers are the same in the model and prototype.

Scaling laws
Conditions that must be satisfied to achieve desired similarity between model and prototype.

Schematization
Representation of a continuum by discrete elements; e.g., dividing a real river into reaches with constant parameters.

Scheme (numerical or computational)
Systematic program of action for solving the governing equations of a mathematical model.

Scour
Concentrated erosive action by water. The enlargement of a flow section or creation of a depression by the removal of bed material through the action of moving water.

Secondary currents (or flow)
The movement of water particles on a cross section normal to the principal direction of flow.

Sediment
Solid fragmental material transported and deposited by the actions of water, wind or ice. A collective term meaning an accumulation of soil, rock, and mineral particles transported or deposited by flowing water.

Sedimentation
Consists of five fundamental processes: (1) erosion or detachment, (2) entrainment, (3) transportation, (4) deposition, and (5) diagenesis, or consolidation. Also refers to the gravitational settling of suspended particles that are heavier than water.

Sedimentation diameter
The diameter of a sphere of the same specific weight and the same terminal settling velocity as a given particle in the same fluid.

Sediment discharge
The mass or volume of sediment (usually mass) passing a stream cross section in a unit of time. The term may be qualified, for example; as suspended-sediment discharge, bedload discharge, or total-sediment discharge. See **Sediment load**.

Sediment-discharge relationship
A relationship required by mobile boundary models. Tables that relate inflowing sediment loads to water discharge for the upstream ends of the main stem, tributaries, and local inflows.

Sediment load
A general term that refers to material in suspension and/or in transport. It is not necessarily synonymous with either discharge or concentration. It may also refer to a particular type of load; e.g., total, suspended, wash, bed, or bed material.

Sediment particle
Solid fragments of mineral material in either a singular or aggregate state.

Sediment sample
A quantity of water-sediment mixture or deposited sediment that is collected to characterize some property or properties of the sampled medium.

Sediment transport (rate)
See **Sediment discharge**.

Sediment-transport function
A formula or algorithm for calculating sediment transport rate given the hydraulics and bed material characterisitics at a cross section. Most sediment transport functions compute the bed-material load capacity. The actual transport may be less than the computed capacity due to armoring, geologic controls, etc., or greater due to fine material (wash load) that originates upstream rather than from the bed.

Sediment-transport routing
The computation of sediment movement for a selected length of stream (reach) for a period of time with varying flows. Application of sediment continuity relations allows the computation of aggradation and deposition as functions of time.

Sediment trap efficiency
See **Trap efficiency**.

Sediment yield
The total sediment outflow from a drainage basin at a specified location for a specific period of time. It includes bed load as well as suspended load and is usually expressed in terms of mass, or volume per unit of time.

Settling velocity
See **Fall velocity**.

Shape factor
See **Particle shape factor**.

Shear stress (boundary shear stress)
Frictional force per unit of area exerted on a channel boundary by the flowing water. An important factor in the movement of bed material.

$$\tau_0 = \gamma RS \tag{E-2}$$

where

τ_0 = unit tractive force;
γ = unit weight of water;
R = hydraulic radius;
S = slope of the channel.

Shear velocity
The shear velocity is defined as the square root of the quantity of shear stress divided by fluid density.

Shield's curve
A curve of the dimensionless tractive force plotted against the grain Reynolds number (i.e., $U^* \cdot D_s / \nu$, where, U^* = turbulent shear velocity, D_s = characteristic or effective size of the grains or roughness elements, and ν = kinematic viscosity).

Shield's parameter
A number also referred to as a dimensionless shear stress. The beginning of motion of bed material is a function of this dimensionless number:

$$\frac{\tau_c}{(\gamma_s - \gamma)D_s} \tag{E-3}$$

where

τ_c = critical tractive force;
γ_s = specific weight of the particle;
γ = specific weight of water;
D_s = characteristic or effective size of the grains or roughness elements.

Sieve diameter
The smallest standard sieve opening size through which a given particle of sediment will pass.

Silt
See Table E-1.

Similarity (or similitude)
Correspondence between the behavior of a model and its prototype.

Simulation
Reproduction of prototype behavior using a model.

Sinuosity
The ratio of the length of a stream measured along its centerline to the length of the valley through which the stream flows.

Sorting
The dynamic process by which sedimentary particles having some particular characteristic (such as similarity of size, shape, or specific gravity) are naturally selected and separated from associated but dissimilar particles by the agents of transportation. Also, see **Gradation**.

Split flow
Flow that leaves the main river flow and takes a completely different path from the main river (Case (a)). Split flow can also occur in the case of flow bifurcation around an island (Case (b)). See Fig. E-10.

Stability (numerical or computational)
The ability of a scheme to control the propagation or growth of small perturbations introduced during numerical calculations. A scheme is unstable if it allows the growth of error to eventually obliterate the true solution.

Stable channel
A stream channel that does not change in planform, cross section or bed profile during a particular period of time. For purposes of this glossary the time period is years to tens of years.

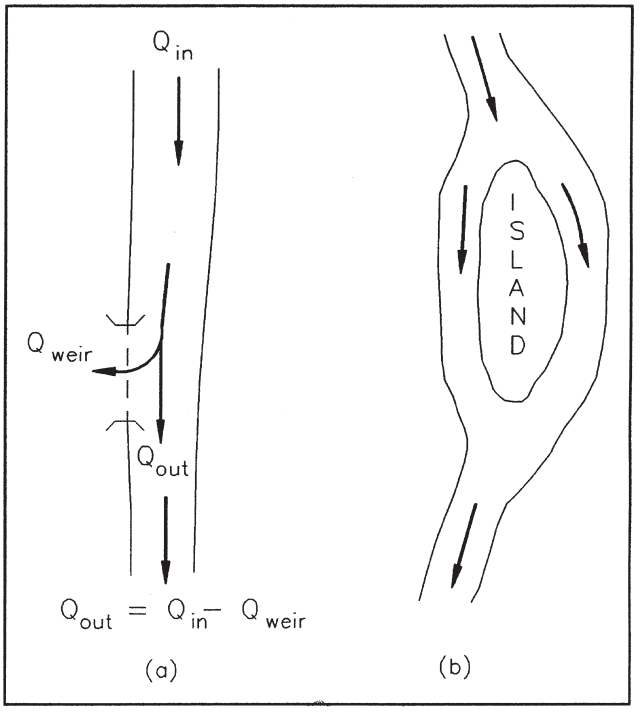

Fig. E-10. Split flow.

Stage
The stage is the vertical distance from any selected and defined datum to the water surface.

Stage-discharge (rating) curve
Defines a relationship between discharge and stage at a given location.

Standard step method
An iterative procedure for calculating water surface profiles for steady gradually varied, one-dimensional flow.

Steady state model
Model in which the variables being investigated do not change with time.

Stochastic model
See **Probabilistic model**.

Stream bank erosion
The removal of bank material primarily by hydraulic action.

Stream discharge
The volume of flow passing a stream cross section in a unit of time.

Stream gauge
A device that measures and records temporal flow characteristics such as water discharge and water surface elevation at a specific location on a stream. Sediment transport measurements are usually made at stream gauge sites.

Stream profile
A plot of the elevation of a stream bed and/or water surface versus distance along the stream.

Stream segment
A term often used in modeling. A stream segment is a specified portion of a river with an upstream inflow point and with a downstream termination at a control point. Primary Inflow points are designated by ℓ_n, where n is the segment number. Primary inflow points are always at the upstreammost end of a tributary or main stem segment. See Fig. E-7.

Subcritical (tranquil) flow
The state of flow where the water depth exceeds the critical depth. Here, the influence of gravity forces dominates the influence of inertial forces.

Supercritical flow
The state of flow where the water depth is below the critical depth, inertial forces dominate the gravitational forces, and the flow is described as rapid or shooting.

Suspended bed-material load
That portion of the suspended load that is composed of particle sizes found in the bed material.

Suspended load
Includes both suspended bed-material load and wash load. Sediment that moves in suspension is continuously supported in the water column by fluid turbulence. Contrast with **Bed load**.

Suspended-sediment discharge
The quantity of suspended sediment passing a cross section in a unit of time. See **Suspended load**.

Thalweg
The line following the lowest part of a valley, whether under water or not. Usually the line following the deepest points along the bed of a river.

Top width
The width of a stream section at the water surface; it varies with stage in most natural channels.

Total sediment discharge
The total rate at which sediment passes a given point on the stream. See **Total sediment load**.

Total sediment load (Total load)
Includes the sum of bed load and suspended load, or the sum of bed-material load and wash load.

Transect
A sample area, cross section, or line chosen as the basis for studying one or more characteristics of a particular assemblage.

Transportation (sediment)
The process of moving sediment particles from place to place once they are entrained into the flow. The principal transporting agents are flowing water and wind.

Transport capacity
The ability of a stream to transport a given volume or weight of sediment material of specific size per time for a given flow condition.

Trap efficiency
Proportion of sediment inflow to a stream reach (or reservoir) that is retained within that reach (or reservoir). Computed as inflowing sediment volume minus outflowing sediment volume divided by inflowing sediment volume. Positive values indicate aggradation; negative values, degradation.

Tributary
A stream or channel that contributes its flow (water and sediment load) to another stream.

Truncation error
The error introduced by replacing the derivative terms of a differential equation by finite differences using a Taylor series and then truncating after a certain number of terms.

Turbulence
In general terms, the irregular motion of a flowing fluid.

Two-dimensional model
Model defined with two space coordinates (i.e., variables are averaged over the third direction).

Unsteady-state model
Model in which the variables being investigated are time-dependent.

Verification
Check of the behavior of a calibrated model against a set of prototype conditions that was not used for calibration.

Wash load
The part of the suspended load that is finer than the bed material. Wash load is limited by supply rather than hydraulics. What grain sizes constitute wash load varies with flow and location in a stream. Sampling procedures that measure suspended load will include both wash load and suspended bed-aterial load. Normally, it consists of sediment particles smaller than 0.062 mm.

Water column
An imaginary vertical column of water used as a control volume for computational purposes. Usually of unit area and the depth of water at that location.

Water discharge
See **Stream discharge**.

Watershed
A topographically defined area drained by a river/stream or system of connecting rivers/streams such that all outflow is discharged through a single downstream outlet. Also called a drainage area.

Weir
A small dam in a stream, designed to raise the water level or to divert its flow through a desired channel.

Wetted perimeter
The wetted perimeter at a cross-section is the length of the wetted contact between a stream of flowing water and its containing channel, measured in a direction normal to the flow.

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