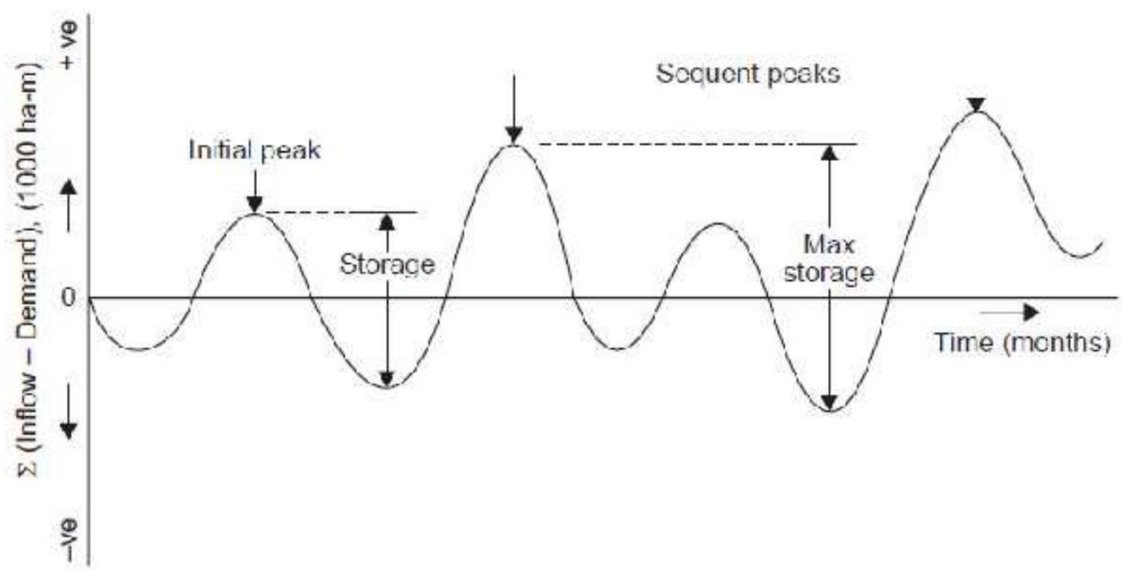
4.2 RESERVOIRS CAPACITY

4.2.1 SELECTION OF RESERVOIR CAPACITY

The determination of the required capacity of a storage reservoir is usually called an 'operation study' using a long-synthetic record. An operation study may be performed with annual, monthly, or daily time intervals; monthly data are most commonly used.

When the analysis involves lengthy synthetic data, a computer is used and a sequent-peak algorithm is commonly used. Values of the cumulative sum of inflow minus withdrawals taking into account the precipitation, evaporation, seepage, water rights of the downstream users, etc., are calculated, (Fig.). The first peak and the next following peak, which is greater than the first peak, i.e., the sequent, peak, are identified.



Sequent peak algorithm

The maximum difference between this sequent peak and the lowest trough during the period under study is taken as the required storage capacity of the reservoir

4.2.2 RESERVOIR MASS CURVE

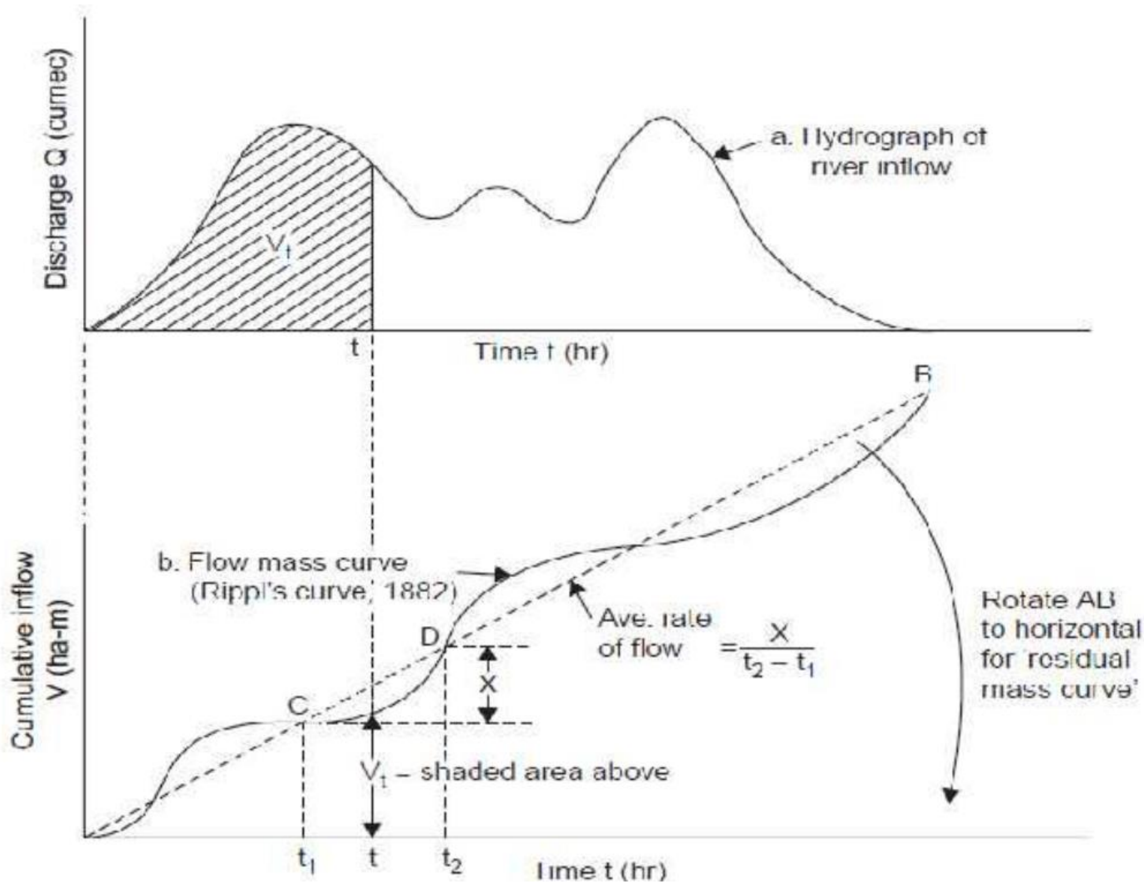
A mass curve (or Rippl diagram, 1882) is a cumulative plotting of net reservoir inflow (Fig.), and is expressed as

$$V(t) = \int_0^t Q(t)dt$$

where V(t) = volume of runoff

Q(t) = reservoir inflow

both as functions of time



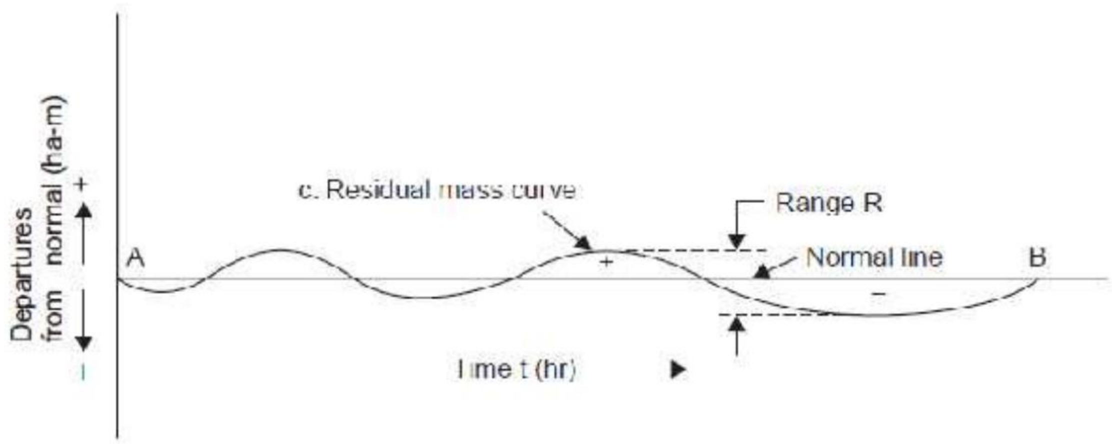


Fig. 16.14 Flow and residual mass curves

The instantaneous rate of flow at any point on the mass curve is given by the slope of the tangent at the point, i.e

$$Q(t) = \frac{dV(t)}{dt}$$

As already discussed, the mass curve has many useful applications in the design of a storage reservoir, such as determination of reservoir capacity, operations procedure and flood routing.

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