POWER POINT PRESENTATION ON TACHEOMETRY

BY

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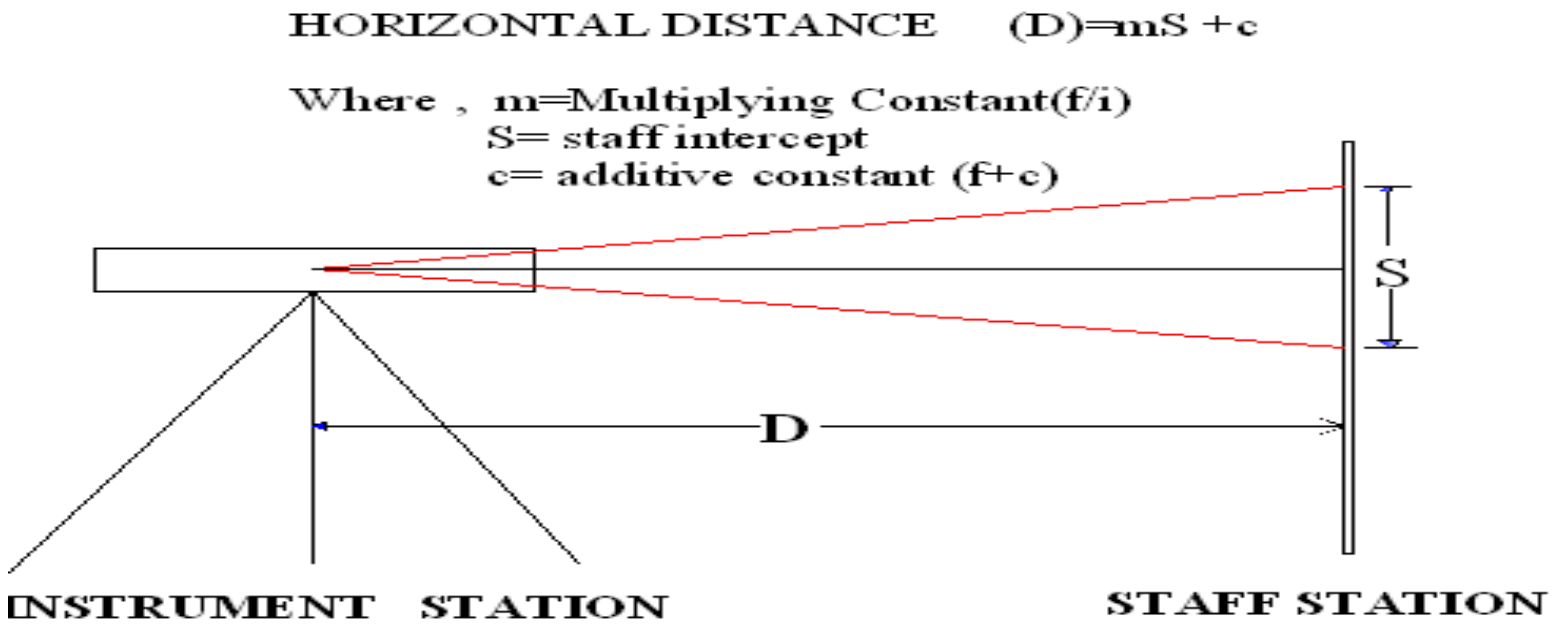
Tacheometry

Definition-It is the branch of angular surveying the Horizontal distances from station to the staff and the vertical distance of a point are determined from instrumental observation

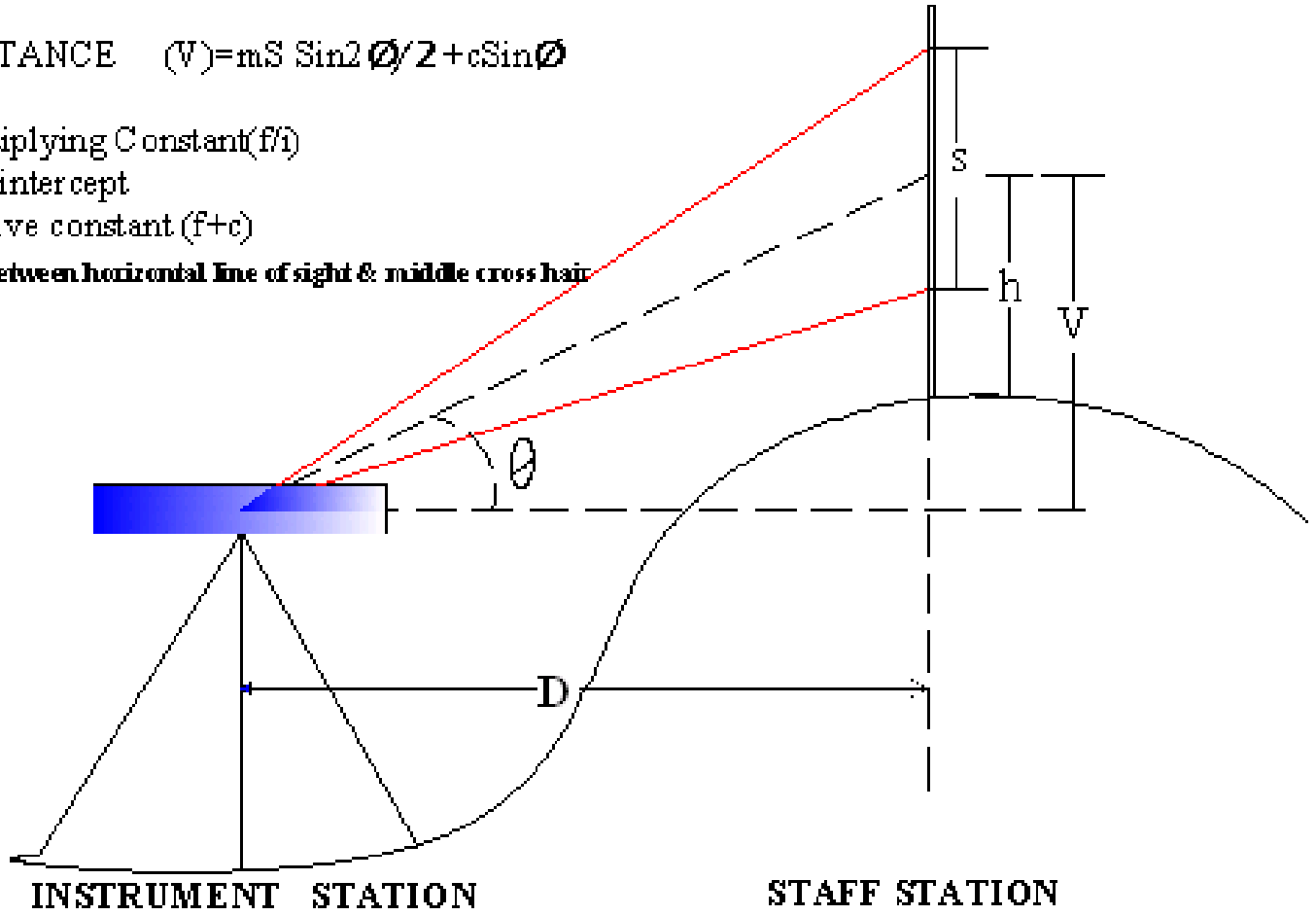
Horizontal distance



Vertical distance

VERTICAL DISTANCE (V)=mS Sin2Ø/2+cSinØ

Where, m=Multiplying Constant(f/i)
S= staff intercept
c= additive constant (f+c)
Ø=Angle between horizontal line of sight & middle cross hair



Situation where tacheometry can be used

- When obstacles like river, broken ground,streches of water, tacheometry gives speed & accuracy to work.
- In rough country where measurement of horizontal & vertical distances are difficult, inaccurate & slow.
- In locating contours & filling details in a topographic survey, this method is fast & best.

Advantages of tacheometry

- Tacheometer is used where chaining is difficult such as river, vally, broken boundries, stiff slope, undulations.
- It is used in the preparation of contour maps, in which horizontal & vertical distances are required to be measured.
- It is used for the survey road, railway.
- It is also used for the hydrographic survey.
- It is used for checking distances measured by tape, chain & dumpy level.
- It is used where accuracy is not required.
- It saves time & money.

Difference between theodolite and tacheometer

Theodolite

- It is used for measurement of horizontal & vertical angle.
- In theodolite survey , distances are measured by chain or tape.
- Suitable for plane & hilly area with less obstacles.
- More stations are required in theodolite survey.

Tacheometer

- It is used for measurement of horizontal & vertical distances.
- In tacheomtric survey ,direct measurement of distances are possible.
- Suitable in case obstacles like river broken ground.
- Less stations are required in tacheometric survey.

Constants of Tacheometer

- Multiplying constant ie. (f/i) or m.
- Additive constant ie (f+c) or C.

Where f= focal length of image glass

c= legth of image

Object of tacheometry

- Preparation of contour maps or plans.
- Used in hydrographic survey.
- Location survey for roads,railways, reservoir etc.
- For checking of more precise measurements.

Instrument used in Tacheometer

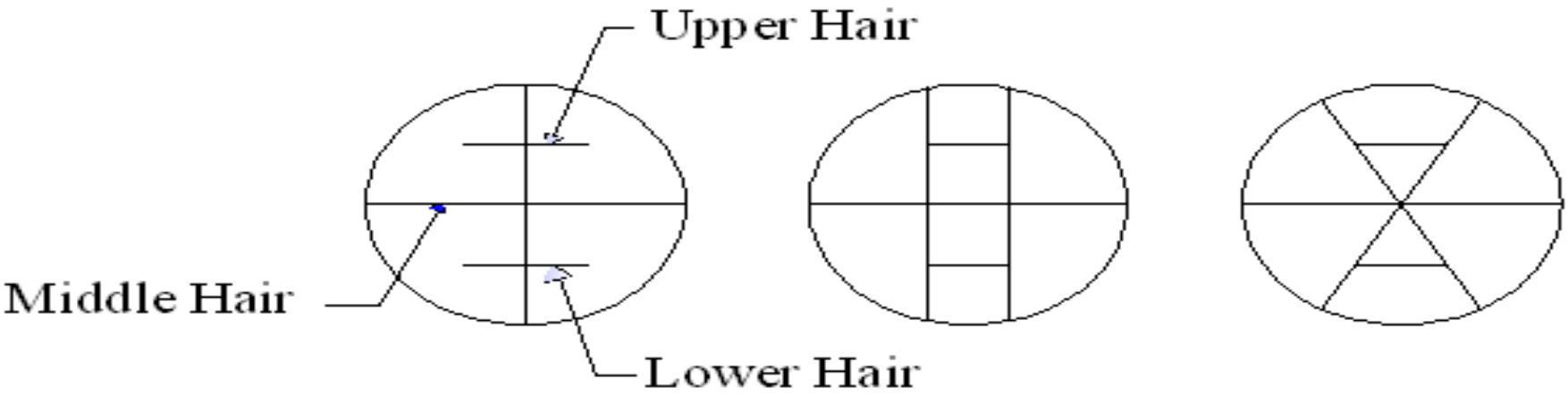
I) Tacheometer

II) Levelling or stadia rod

I)Tacheometer –It is a transit theodolite provided with a stadia diaphragm.

- The diaphragm is provided with two horizontal stadia hairs in addition to regular cross hair.
- Additional hair should be equidistant from central one.
- Types of diaphragm commonly used as follows.

Types of diaphragm



Types of Telescope in Tacheometry

- External focusing
- Internal focusing
- External focusing fitted with anallatic lens.

Anallatic lens -It is an additional lens generally provided in the external focusing tacheometer between object glass & eyepiece

Advantages of anallatic lens.

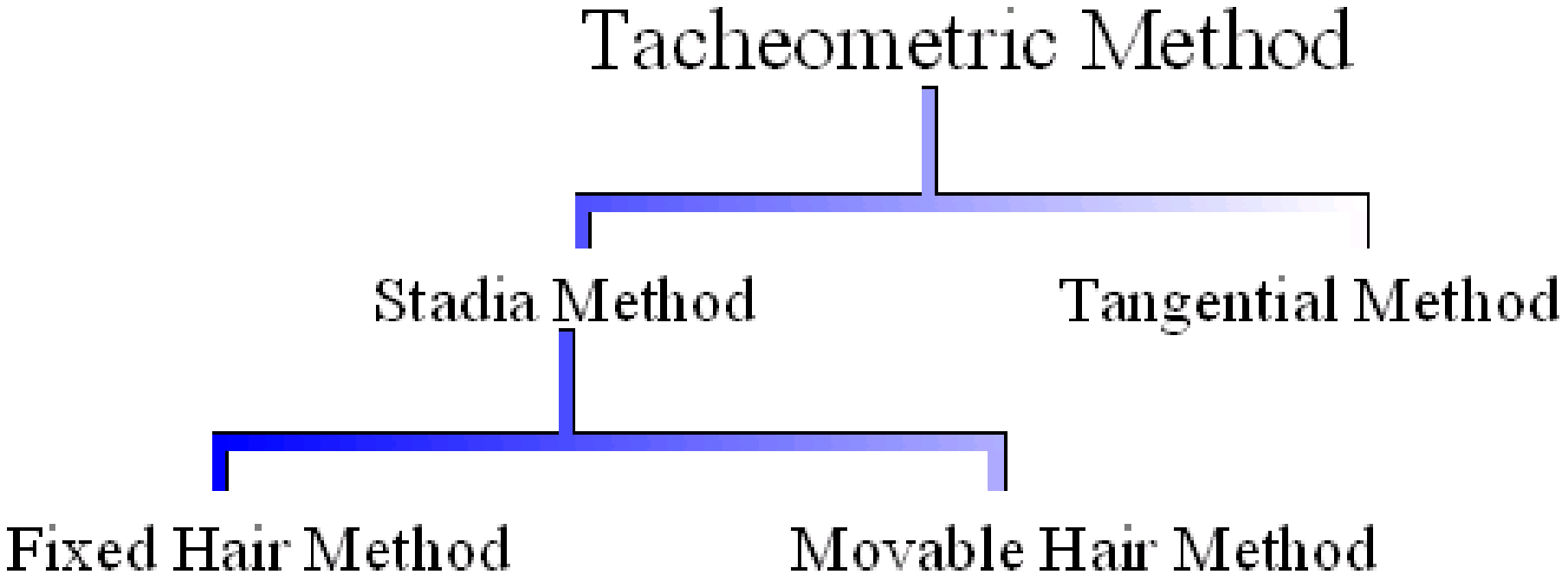
1) For calculation of horizontal & vertical distances constant (f+c)=0, if tacheometer is provided with anallatic lens.
2) Calculation becomes simple.

Essential characteristics of Tacheometer

- The value of constant (f/i)=100.
- The telescope should be provided with anallatic lens.
- The telescope should be powerful, magnification should be 20 to 30 times the diameter.
- The vision through the telescope should be clear & bright image at longer distance.

II)Levelling staff or stadia rod.

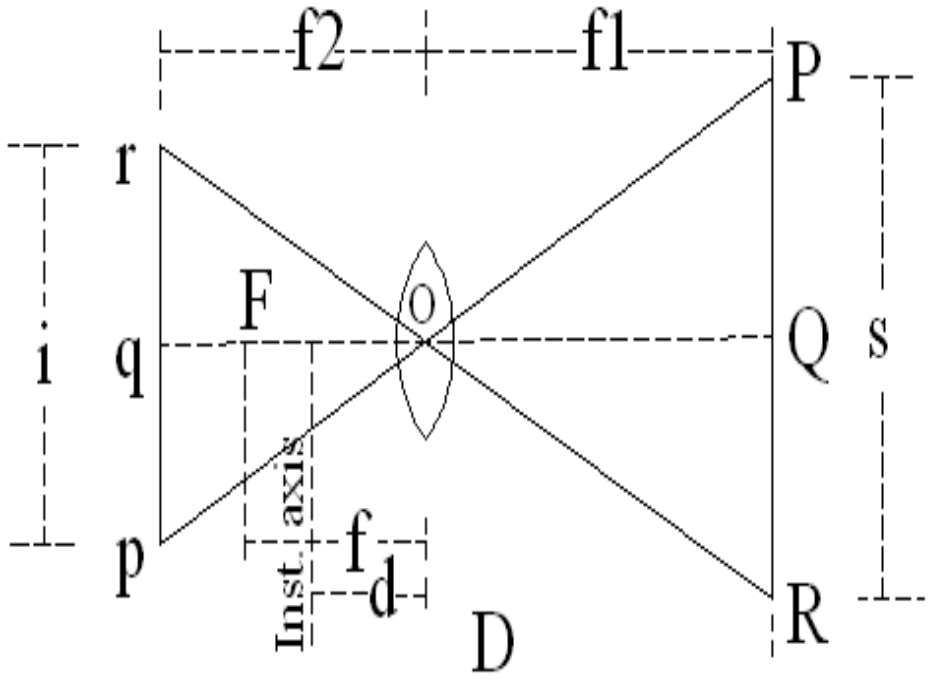
- Levelling staff or stadia rodused with tacheometer may be usual type of levelling staff.
- It may be folding or telescopic with is 5 cm to 15 cm. & height 3 m to 5 m.
- It may measure meter , decimeter & centimeter.


Tacheometric Method
Stadia Method
Tangential Method
Fixed Hair Method
Movable Hair Method

Fixed Hair Method

- In this method, the distance between two stadia hair is fixed.
- The reading corresponding to three cross hair is taken and difference between top and bottom hair is found out known as staff intercept.

Principle of stadia method



From similarity of triangle POQ & poq .

PR/pr =OQ/oq

S/i = f1/f2

By lens formula

1/f= (1/f1)+(1/f2)

Multyplying f1 to both side

f1×(1/f) = f1×(1/f1)+f1×(1/f2)

F1/f = 1+(f1/f2)

Put values of (f1/f2) = S/i

f1/f = 1+ (S/i)

(f1/f)-1 = S/i

(f1-f)/f = S/i

f1= S/i ×f+f eq 1

Now, D= f1+d or f1=D-d eq 2

Put values of equation 2 in 1

D-d = S/i×f+f

D=(f/i)×S+(f+d) eq 3

(f/i) =multiplying constant= m

(f+d)= additive constant =c

D= ms+ c

P, Q, R=Three line of sight on staff corresponding to three line.

P, q, r=the stadia hairs

O= optical center of object glass.

pr= i = stadia interval.

PR= s = staff intercept.

f = focal length of object glass.

f_1 = horizontal distance between center of object glass to the staff station.

f_1 = horizontal distance of diaphragm from ‘o’

D= horizontal distance of staff station from vertical axis of taceometer.

d= horizontal distance between vertical axis of tacheometer & center bof object glass.

Fixed Hair Method

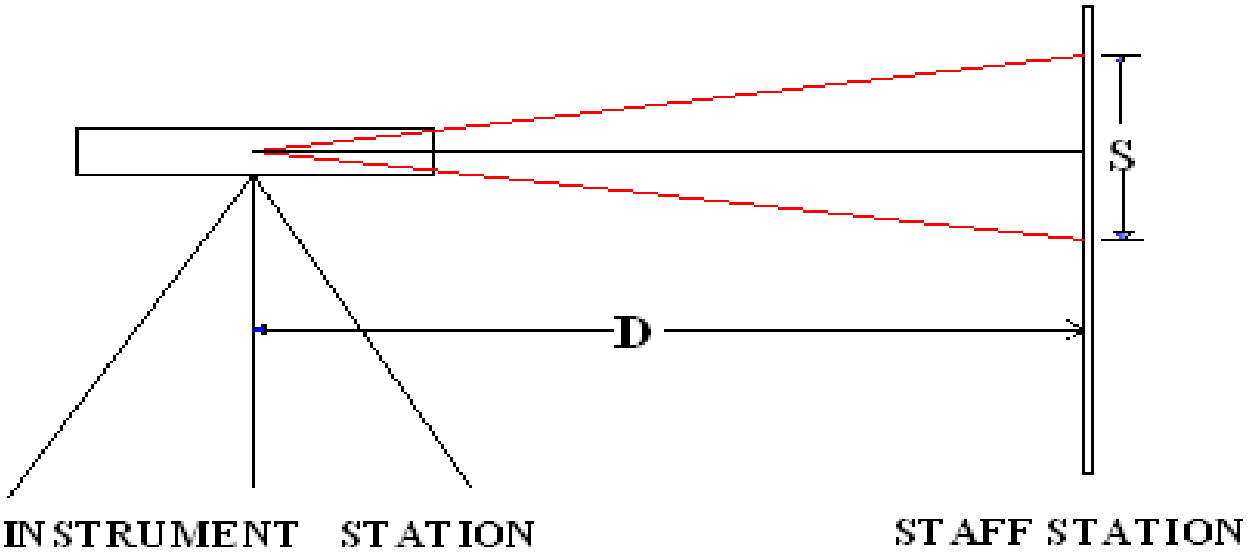
There are three different cases used.

Case I): Line of sight is horizontal and the staff held is vertical.

Case II): Line of sight is inclined and the staff held is vertical.

Case III): Line of sight is inclined and the staff held is normal to the line of sight.

Case I): Line of sight is horizontal and the staff held is vertical.



HORIZONTAL DISTANCE(D)=(f/i)S+(f+d)

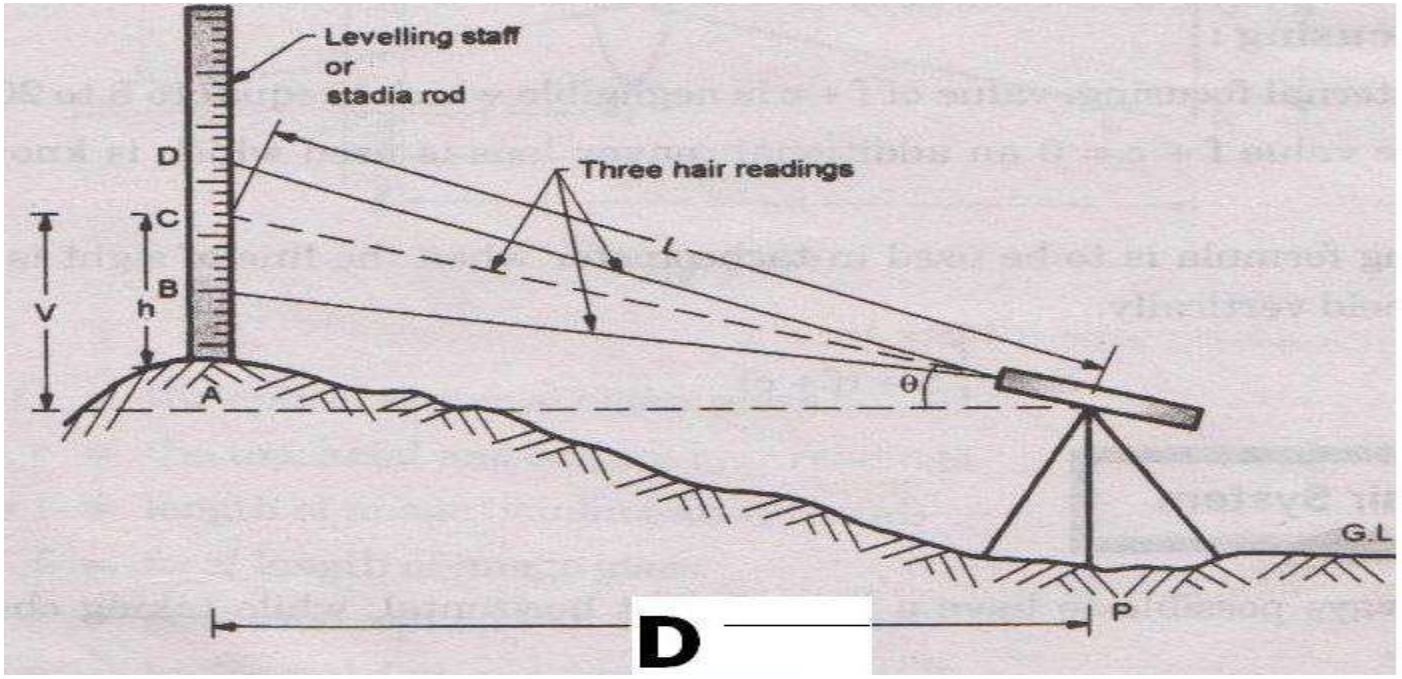
(D)=mS +c

Where , m=Multiplying Constant(f/i)

S= staff intercept

c= additive constant (f+c)

Case II): Line of sight is inclined and the staff held is vertical.



Vertical Distance $V=(f/i)S\ \frac{\sin 2\theta}{2}+(f+c)\sin\theta$

Horizontal Distance $D=(f/i)S\cos^2\theta+(f+c)\cos\theta$

Where, θ is angle between horizontal line of sight & central reading0