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Research Article

MATHEMATICS FUNCTIONS USING TO CONSTRUCT A DAM

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Abstract

All of these measurements are computed using the mathematical concept. A turbine attached to a generator generates electricity when water is discharged through the dam. On the downstream side of the dam, the water flows back into the river. The Kallanai was built to redirect the Cauvery's waters over the lush Thanjavur delta area so that canals could be used for agriculture. This dam's primary purpose was to keep the supply in the Cauvery and its branches while transferring the excess into Coleroon via the Ullar River. By opening the anaikut and barrage gates, the flood waters can enter the sea through the other three delta branches as well. Using a function equation, the hydrodynamic pressure of water caused by an earthquake is determined. Vertical and axial springs assume the forces of sediment and foundation. We would have a slope in the case of dams. Numerous elements that affect water flow will be taken into account when calculating the slope. In order to compute the water's flow rate, mathematical principles will also be required. A relation between a set of inputs and a set of acceptable outputs that has the characteristic that each input is connected to exactly one output is called a function in mathematics.

Keywords: *Wight, mass, depth, domain, co-domain.*

Introduction

In order to hold water, dams are constructed across streams, rivers, or estuaries using mathematical concepts. Dams are constructed to supply drinkable water for irrigating desert regions. This study's primary and innovative contributions include mathematical modelling and numerical analysis of a concrete dam with integrated water, sediment, foundation, and earthquake effects. For this, exponential shear deformation beam theory is used to describe a concrete dam. In the case of dams we could we would have a slope will be computed by considering numerous aspects which will have control on water flow. The pressure grows the deeper the dam gets if you know the area of the dam wall.

The goal of the Kallanai was to divert the Cauvery's water across the fertile delta region for irrigation via canals and to its northern delta branch, Kollidam and Coleroon. The area irrigated by the ancient irrigation network is approximately 69,000 across; by the 20th century, the irrigation area had grown to approximately one million across. The speed of the water will be calculated while it is flowing, which also requires mathematical concepts. In mathematics, a function is a relation between a set of inputs and a set of permissible outputs with the property that each input is related to exactly one output.

History of Kallanai Dam

The Grand Anaikut, or Kallanai, is an old dam constructed in 150 CE by Karikala of the

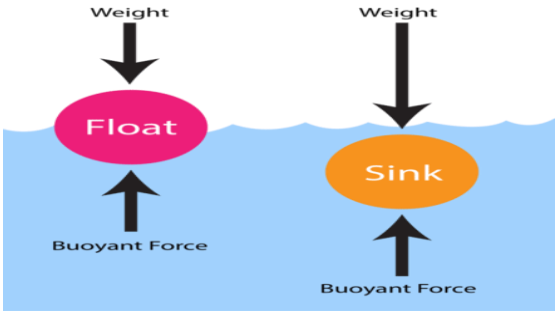
Chola dynasty. In the Tamilnadu district of Trichy, it is situated on a river 14 kilometers from the city of Tiruchirapalli and 45 kilometers from the city of Thanjavur. The objective of underlying the construction of the Dam was to divert the water to the delta districts so enhancing agriculture. This dam was reconstructed by the British during the 19th century in 1804, Captain Caldwell, a military engineer, was assigned by the British to do a study on the Cauvery River and encourage irrigation for the delta region. He discovered that a significant amount of water flowed onto the kollidam, leaving only a tiny amount for irrigation. Twenty kilometers west of Kallanai, the Cauvery River divides in two. Initially, Caldwell suggested raising the dam, which increased the dams' capacity by lifting the stones to a height of 69 cm. It is the oldest water diversion and regulator construction still in use in India and the fourth oldest in the world.

Construction of Dam

Originally constructed of rocks, the dam was eventually repaired and rebuilt using concrete during the British era. These are the steps involved in building a dam. Rocks are the primary component of this dam. The rocks are positioned right in the Kaveri River's path. The stones are positioned in their appropriate locations. To keep stones stable, an outside push or thrust is needed. In the fast-moving water, we are unable to push the stones. Thus, they loaded the erosion process and used a straightforward technique to submerge the stone in the river.

One stone is positioned at the bottom, while another is positioned above it. It will be positioned correctly by erosion. This technique is simply explained by beach waves. While our legs are planted on the beach. The sand particle on the side of our legs will be carried over by the waves. As a result, our legs are buried in the sand on the beach. This is the stone placement principle. Because of this, the dam's basement is composed of sand.

The Cauvery River was dammed using this technique. The construction is made much stronger and more durable by the sand bed. This will demonstrate our ancestors' and our own labour and expertise.



Dam was built in 15,000cm to 30,000cm

Friction is increasing in corner of water so that speed of water is decreasing.

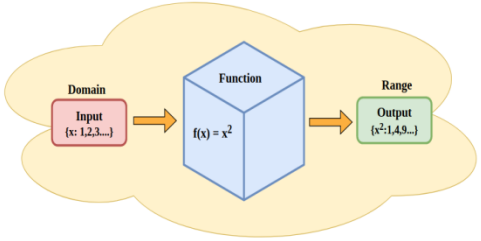
There is no friction in center of the water then speed of the water is increasing.

Function

Let A and B be any two sets. A function f from A into B is a subset of A*B with the property that each a belongs to a precisely one pair$< a, b >$.

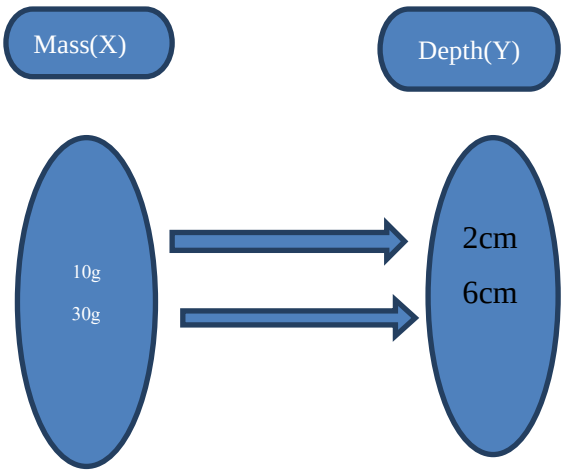
Instead of $< x, y >$ belongs to f we write$y = f(x)$. Then y is called a image of x and f. The set A is called domain of f. The range f is a set {b belongs to B /$b = f(a)$ for some a}. That is range f is subset of B consisting of all image of element of A. Such function is called a mapping of A into B.

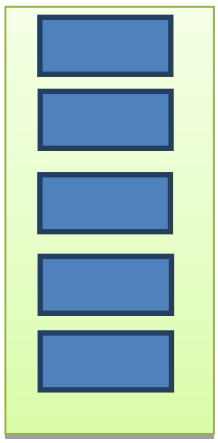
Example



Using function method to forms the values of mass(x) and the values of depth (y). We give the input as 10g of mass then the output will 2cm of depth. Then second time 30g of mass is input then the output will 6cm of depth.

A function method is using to find the solution of problems.





5y=x

Now we will assumed that depth of y, is 5 time greater than mass of x then the equation is $x = 5y$.

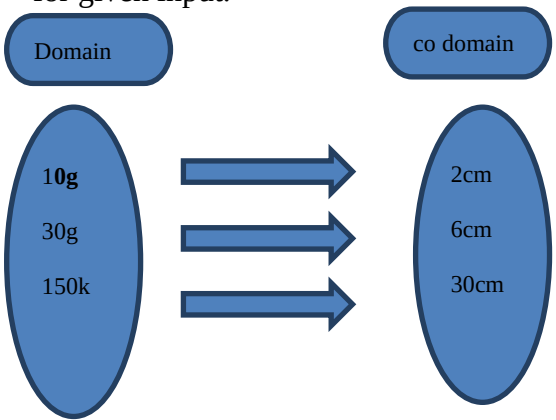
We know the value of y so that we rewrite the equation $y = x/5$

$$y = 30{,}000cm \qquad x = ?$$

$$x = 5y$$

$$x = 5 * 30{,}000x = 1{,}50{,}000g$$

Finally using this method we find the solution for given input.



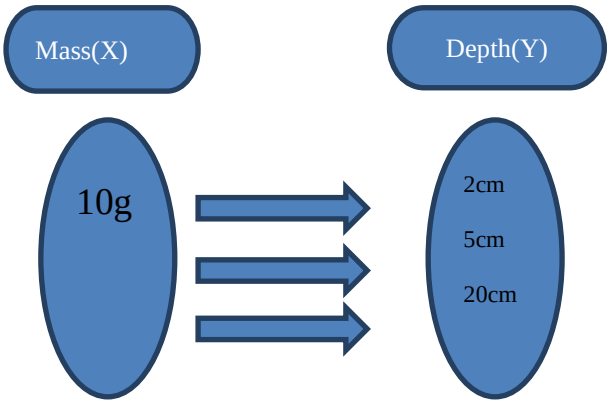
One To One Function

One to one function a function is called one to one or an injective $f(a), f(b)$for any two different elements and A and B of the domain.

Example

The following is example of square function of natural numbers is $f(x) = x^2$ is one to one function.

Now we using one to one function to write paired but figure 1 is not a function. Because co domain have



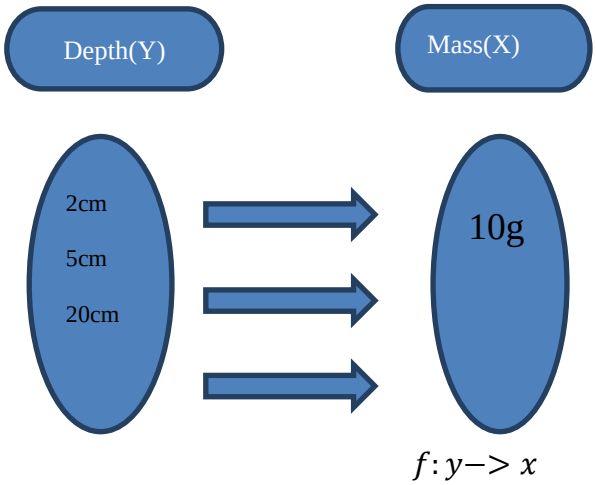
$F: x -> y$

Only one domain say to function.

It is not a function.

So that using inverse function to rewrite the function now this function.

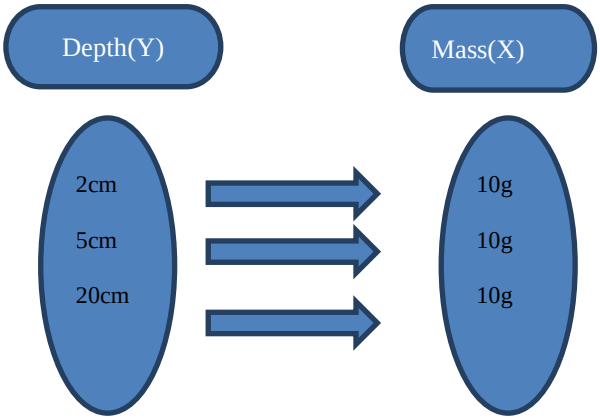
Inverse Function



$f: y -> x$

It is an inverse function.

Function is one to one forms in below figure



Using the above figure we can write the equation of dam.

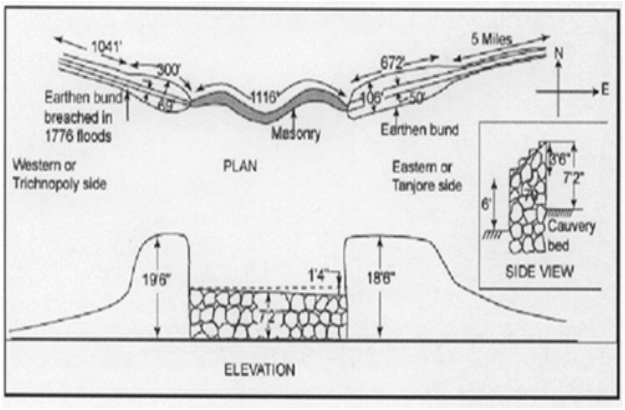
The corner of river y is 5 times greater that x, then the equation is $x = 5y$ is equation 1.

$$X = 5y$$

$$X = 5(30000)$$

$X = 150000$Grams

The half of river is y is 2 times greater than x, and then the equation is $x = 2y$ is equation 2.



$$X = 2y$$

$$X = 2(30000)$$

$X = 60000$Grams

Finally the middle of river is x is 2 times greater than y, and then the equation is $x = y/2$ is equation 3.

$X = y/2X = 30000/2\ X = 15000$Grams

Conclusion

We formulated a functions control problems of dam reservoir system with hydropower production. The model is simple and mathematically rigorous. We found a solution to its optimally equation and approximated the equation with a high resolution finite difference scheme. Dams or renowned both for the positive changes they bring about such flood control, irrigation and hydropower, and for their negative impacts, including displacement of people, change in water and sediment flows, and disruption to environmental services and livelihoods.