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Research Article

FOCUS ON MATHEMATICS AMONG STUDENTS

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ABSTRACT

Mathematics is widely used in every engineering fields. The purpose of this paper is to relate mathematics to engineering subject. The students have studied mathematics before (calculus, linear algebra, numerical analysis) but when they study engineering subjects which involve mathematics they often cannot relate mathematics to those subjects. It is expected that this paper can motivate engineering students to understand mathematics better. Mathematics should be enjoyable as it has helped engineering evolved. This paper portraits the role of mathematics in all aspects of our daily life.

INTRODUCTION

The study of Mathematics as a study in its own right begins in .the 6th century BC with the Pythagoras, who coined the term “Mathematics” from the ancient Greek (meaning mathema), meaning “subject of instruction”. For more than 2000 years, mathematics has been a part of the human search for understanding mathematics discoveries have come both from the attempt to describe the natural world and from the desire to arrive at a form of inescapable truth from careful reasoning. These remain fruitful and important motivations for mathematical thinking , but in the last century mathematics has been successfully applied to many other aspects of the human world : voting trends in politics, the dating of ancient artifacts, the Analysis of automobile traffic patterns and long term strategies for the sustainable harvest of deciduous forests, to mention a few. Today, mathematics as a mode of thought and expression is more valuable than ever before learning to think in mathematical terms is an essential part of becoming a liberally educated person.

Indians invented Zero, but surely no record has ever been found who created the numbers. These numbers are about 30,000 years old. Then came the era of thinkers who created new mathematical operations and began to use them for every kind of purpose. We use mathematics in various fields. We know that mathematics is applied directly or indirectly in our every day life. It’s required every where, anywhere and every time like in Engineering, Medicine, Banking, Business, Construction, Private sector, Defence, Aeronautics, Nuclear research work in every field of Engineering If it is Rainy and cold outside , you will be happy to stay at ahome while longer and have a nice hot cup of tea. But some one has built the house you are in, made sure it keeps the cold out and the warmth in, and provided you with Running water for the tea. This some one is most likely an engineer. Engineers are responsible for just about everything we take for granted in the world around us, from tall buildings, tunnels and football stadiums, to access to clean drinking water. They also design and bulid vehicles, aircraft, boats and ships. What’s more, Engineers help to develop things which are important for the future, such as generating energy from the sun, wind or waves. Mathematics is involved in everything an engineer does, whether it is working out how much concrete is needed to build, a bridge (or) determining the amount of solar energy to power a car Engineering Mathematics is the art of applying mathematics to complex real-world problems. It combines mathematical theory, practical engineering and scientific computing to address today's technological challenges. It is a creative and exciting discipline, spanning traditional

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boundaries. Engineering mathematics (also called Technomath) is a branch of applied mathematics concerning mathematical methods and techniques that are typically used in engineering and industry. Along with fields like engineering physics and engineering geology, (both of which may belong in the wider category engineering science), engineering mathematics is an interdisciplinary subject motivated by engineers' needs both for practical, theoretical and other considerations out with their specialization, and to deal with constraints to be effective in their work.

Usage of Mathematics in Various Aspects

In mathematics, Fourier analysis is the study of the way general functions may be represented or approximated by sums of simpler trigonometric functions. Fourier analysis grew from the study of Fourier series, and is named after Joseph Fourier, who showed that representing a function as a sum of trigonometric functions greatly simplifies the study of heat transfer. Today, the subject of Fourier analysis encompasses a vast spectrum of mathematics. In the sciences and engineering, the process of decomposing a function into oscillatory components is often called Fourier analysis, while the operation of rebuilding the function from these pieces is known as Fourier synthesis. For example, determining what component frequencies are present in a musical note would involve computing the Fourier transform of a sampled musical note. One could then re-synthesize the same sound by including the frequency components as revealed in the Fourier analysis. In mathematics, the term *Fourier analysis* often refers to the study of both operations.

The decomposition process itself is called a Fourier transformation. Its output, the Fourier transform, is often given a more specific name, which depends on the domain and other properties of the function being transformed. Moreover, the original concept of Fourier analysis has been extended over time to apply to more and more abstract and general situations, and the general field is often known as harmonic analysis. Each transform used for analysis (see list of Fourier-related transforms) has a corresponding inverse transform that can be used for synthesis. Fourier analysis has many scientific applications – in physics, partial differential equations, number theory, combinatorics, signal processing, imaging, probabilitytheory, statistics, forensics, optionpricing, cryptogra phy, numerical.Analysis, acoustics, oceanography, sonar, optic s, diffraction, geometry, protein structure analysis, and other areas.

In forensics, laboratory infrared spectrophotometers use Fourier transform analysis for measuring the wavelengths of light at which a material will absorb in the infrared spectrum. The FT method is used to decode the measured signals and record the wavelength data. And by using a computer, these Fourier calculations are rapidly carried out, so that in a matter of seconds, a computer-operated FT-IR instrument can produce an infrared absorption pattern comparable to that of a prism instrument.

Fourier transformation is also useful as a compact representation of a signal. For example, JPEG compression uses a variant of the Fourier transformation (discrete cosine transform) of small square pieces of a digital image. The Fourier components of each square are rounded to lower arithmetic precision, and weak components are eliminated entirely, so that the remaining components can be stored very compactly. In image reconstruction, each image square is reassembled from the preserved approximate Fourier-transformed components, which are then inverse-transformed to produce an approximation of the original image.

Numerical analysis is the study of algorithms that use numerical approximation (as opposed to general symbolic manipulations) for the problems of mathematical analysis (as distinguished from discrete mathematics).One of the earliest mathematical writings is a Babylonian tablet from the Yale Babylonian Collection (YBC 7289), which gives a sexagesimal numerical approximation of the square root of 2, the length of the diagonal in a unit square. Being able to compute the sides of a triangle (and hence, being able to compute square roots) is extremely important, for instance, in astronomy, carpentry and construction. It continues this long tradition of practical mathematical calculations. Much like the Babylonian approximation of the square root of 2, modern numerical analysis does not seek exact answers, because exact answers are often impossible to obtain in practice. Instead, much of numerical analysis is concerned with obtaining approximate solutions while maintaining reasonable bounds on errors. It naturally finds applications in all fields of engineering and the physical sciences, but in the 21st century also the life sciences and even the arts have adopted elements of scientific computations. Ordinary differential equations appear in celestial mechanics (planets, stars and galaxies); numerical linear algebra is important for data analysis; stochastic differential equations and Markov chains are essential in simulating living cells for medicine and biology.

Before the advent of modern computers numerical methods often depended on hand interpolation in large printed tables. Since the mid 20th century, computers calculate the required functions instead. These same interpolation formulas nevertheless continue to be used as part of the software algorithms for solving differential equations. The overall goal of the field of numerical analysis is the design and analysis of techniques to give approximate but accurate solutions to hard problems

A differential equation is a mathematical equation that relates some function with its derivatives. In applications, the functions usually represent physical quantities, the derivatives represent their rates of change, and the equation defines a relationship between the two. Because such relations are extremely common, differential equations play a prominent role in many disciplines including engineering, physics, economics, and biology.

In pure mathematics, differential equations are studied from several different perspectives, mostly concerned with their solutions-the set of functions that satisfy the equation. Only the simplest differential equations are solvable by explicit formulas; however, some properties of solutions of a given differential equation may be determined without finding their exact form.

If a self-contained formula for the solution is not available, the solution may be numerically approximated using computers. The theory of dynamical systems puts emphasis on qualitative analysis of systems described by differential equations, while many numerical methods have been developed to determine solutions with a given degree of accuracy.

Integration (mathematics), the computation of a definite integral, a fundamental concept of calculus, which allows, among many other uses, computing areas and averaging continuous functions. Indefinite integration, in calculus, the process of calculating indefinite integrals, also known as antiderivatives. Symbolic integration, the computation, mostly on computers, of antiderivatives and definite integrals in term of formulas. Numerical integration, the numerical methods for computing, usually with computers, definite integrals and, more generally, solutions of differential equations. Order of integration, the number of times a time series must be first differenced in order to make it stationary.

The Laplace transform is named after mathematician and astronomer Pierre-Simon Laplace, who used a similar transform (now called the *z*-transform) in his work on probability theory. The current widespread use of the transform (mainly in engineering) came about during and soon after World War II although it had been used in the 19th century by Abel, Lerch, Heaviside, and Bromwich. The early history of methods having some similarity to Laplace transform is as follows. From 1744, Leonhard Euler investigated integrals as solutions of differential equations but did not pursue the matter very far. Joseph Louis Lagrange was an admirer of Euler and, in his work on integrating probability density functions, investigated expressions which some modern historians have interpreted within modern Laplace transform theory.

These types of integrals seem first to have attracted Laplace's attention in 1782 where he was following in the spirit of Euler in using the integrals themselves as solutions of equations. However, in 1785, Laplace took the critical step forward when, rather than just looking for a solution in the form of an integral, he started to apply the transforms in the sense that was later to become popular. He used to transform the whole of a difference equation, in order to look for solutions of the transformed equation. He then went on to apply the Laplace transform in the same way and started to derive some of its properties, beginning to appreciate its potential power. Laplace also recognised that Joseph Fourier's method of Fourier series for solving the diffusion equation could only apply to a limited region of space because those solutions were periodic. In 1809, Laplace applied his transform to find solutions that diffused indefinitely in space.

Cryptography is the process of encrypting data so that the third party can’ read it and privacy can be maintained. It was started with the TV cable industries where even people who were not the customer could watch the TV programs. To prevent this, it was so much necessary to develop a system that can keep the privacy unbroken and only paid customers can watch the progress of corresponding TV channels. This is done with the help of matrices. Place the data into a matrix. Multiply the data by the encoding matrix. By converting the text of the message into a stream of numerical values, that is we assign a number for each letter of the alphabet such that A is 1, B is 2, and so on. Also, we assign the number 27 to space between two words.

Geometry is the study of shapes of various sort used in many type of games. It is a part of mathematics concerned with questions of size, shape and relative position of figures and with properties of space. The basic idea is to turn a mathematical description (point, line, plane, cube etc) of a world into a picture of what that world would look like to someone inside the world. In many applications of trigonometry the essential problem is the solution of triangles. If enough sides and angles are known, the remaining sides and angles as well as the area can be calculated and the triangles then said to be solved. Surveyors apply the principles of geometry and trigonometry in determining the shapes measurements and position of features on or beneath the surface of the earth (Tunnels, dams, design roof, etc)

Graph theory the study of graph is to find the easy route that can be used by a sailor from one part to another. Nodes, Edges and graphs are the best route to explain how the computer works, that is it makes a graph where every interesting point is a node and every way of walking from one node to another is an edge, then it solves the problem

Engineering Fields

Resistors, inductors, capacitors, power engineering ,analysis of electric magnetic fields and their interactions with materials and structures. Digital signal processing, image processing Oscillating waves, radio frequency, antenna design, design of power generating equipment. Fluid flow, Stress Analysis. Traffic engineering and modelling. Resolving forces in a plane, design of gears, design of air plane landing gear.

CONCLUSION

Maths has the power to comfort us and also destroy us the only important question that remains is who handles it and how. Because maths is too hot to handle and too cold to hold, Engineering + Maths = Everything, Engineering – Maths = Nothing. If people donot believe that mathematics is simple, it is only because they do not realize how complicated life is.- John Louis Von Neumann.

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