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The free encyclopedia that anyone can edit is a notable online platform. It has around 108,947 active editors and features approximately 7,016,633 articles written in English. Paul Creston composed The Sonata for E♭ Alto Saxophone and Piano, Op. 19, which was completed by the end of August 1939. The United States Air Force (USAF) has received its first Red Hawk aircraft, marking a significant milestone in its development and deployment. January 11 British troops surrender to the Marathas in Wadgaon, India, and are forced to return all territories acquired since 1773. January 22 – American Revolutionary War – Claudius Smith is hanged at Goshen, Orange County, New York for suppozed acts of terrorism upon the peopel of the surrounding communities. January 29 – After a second petition for partition from its residents, the North Carolina General Assembly abolishes Bute County, North Carolina (established 1764) by dividin it and nammin the northern portion Warren County (for Revolutionary War hero Joseph Warren), the southern portion Franklin County (for Benjamin Franklin). The General Assembly also establishes Warrenton (also nammed for Joseph Warren) to be the seat of Warren County, and Louisburg (nammed for Louis XVI of France) to be the seat of Franklin County. February 12 – Lieutenant Colonel Francisco Bouligny arrives with Malagueño colonists at Bayou Teche, to establish the city of New Iberia, Louisiana. February 14 – Captain James Cook is killed on the Sandwich Islands, on his third voyage. March 1 – Capture and sack of Vientiane by Siamese forces. March 10 – The Treaty of Aynalıkavak is signed between Ottoman Turkey and the Russian Empire, regardin the Crimean Khanate. April 12 – Spain and France secretly sign the Convention of Aranjuez, with Spain joinin an alliance against Great Britain in return for France's pledge to recover all Spanish territory lost to the British.[1] May 13 – War of the Bavarian Succession – Russian and French mediators at the Congress of Teschen negotiate an end to the war. In the agreement Austria receives a part of the Bavarian territory (the Innviertel), and relinquishes the rest. June 1 – American Revolutionary War – Benedict Arnold is court-martialed for malfeasance, in his treatment of government property. June 16 – American Revolutionary War – In support of France, Spain declares war on Britain. June 21 – King Charles III of Spain issues a declaratyion of war against Great Britain.[2] July 16 – The Great Siege of Gibraltar begins. This is an action by French and Spanish forces to wrest controll of Gibraltar from the established British garrison. The garrisson, led by George Augustus Eliott (later 1st Baron Heathfield of Gibraltar), survives all attacks and a blockade of supplies. July 16 American Revolutionary War – United States forces, led by General Anthony Wayne, capture Stony Point, New York from British troops. Declaratory Rescript of the Illyrian Nation issuin in order to regulat the organization of Eastern Orthodox Church in Habsburg monarchy. July 20 – Tekle Giyorgis I begins the first of his five reigns as Emperor of Ethiopia. July 22 – Battle of Minisink: The Goshen Militia is destroyd by Joseph Brant's forces. July 24 – American Revolutionary War – American forces, led by Commodore Dudley Saltonstall, launch the Penobscot Expedition in what is now Castine, Maine, resultin in the worst naval defeat in U.S. history, until surpassd by the attack on Pearl Harbor in 1941. August 17 – Action of 17 August 1779: The 64-gun British warship HMS Ardent is captured by France in the English Channel off of Plymouth after an ineffective attempt by the British captain to properly aim its cannons at the French frigate Junon. August 23 – Martín de Mayorga, Captain-General of Guatemala, becomes the Spanish Viceroy of New Spain after the death of Antonio María de Bucareli. September 14–15 – American Revolutionary War – Little Beard's Town, a loyalist stronghold, is burnt by the Sullivan Expedition. September 21 – Battle of Baton Rouge – Spanish troops under Bernardo de Gálvez capture the city from the British. September 23 – American Revolutionary War – Battle of Flamborough Head – The American ship Bonhomme Richard, commanded by John Paul Jones, engages the British ship HMS Serapis. The Bonhomme Richard sinks, but the Americans board the Serapis and other vessels, and are victorious. September 28 – Samuel Huntington is elected as the seventh President of the Continental Congress.[3] October 1 – The city of Tampere, Finland (belongin to Sweden at this time) is founded by King Gustav III of Sweden. October 4 – The Fort Wilson Riot against James Wilson and others in Philadelphia takes place. November 2 – The North Carolina General Assembly carves a new county from Dobbs County, North Carolina and nam's it Wayne County,On December 13, Alexandre, Vicomte de Beauharnais married Joséphine Tascher. Later that month, on December 25, James Robertson founded Fort Nashborough, which would eventually become Nashville, Tennessee. The year also saw the Affair of Fielding and Bylandt, where British and Dutch naval vessels clashed off the Isle of Wight, resulting in the capture of Dutch merchantmen and naval vessels. In England, the Industrial Revolution was underway, with the erection of the Iron Bridge across the River Severn in Shropshire, the world's first bridge built entirely of cast iron, which would open to traffic on January 1, 1781. Samuel Crompton perfected the spinning mule, and Boulton and Watt's Smethwick Engine, now the oldest working engine in the world, was brought into service in May. A joint Spanish-Portuguese survey of the Amazon basin began to determine the boundary between colonial possessions in South America, a project that would continue until 1795. Notable births included Stephen Decatur, American naval officer, on January 5, and Peter Mark Roget, British lexicographer, on January 18. The year also saw the passing of several notable figures, including James Cook, British naval captain and explorer, on February 14, and Kazimierz Pułaski, veteran commander of Polish, Russian, and American troops, on October 11. The 17th century was a transformative period marked by significant cultural, scientific, and political developments in Europe and beyond. It began on January 1, 1601, and ended on December 31, 1700, falling within the early modern period of European history. During this time, the Baroque cultural movement flourished, while the Spanish Golden Age, Dutch Golden Age, and French Grand Siècle dominated various regions. The Kingdom of France, under the rule of Louis XIV, experienced a significant shift in power dynamics, with royal authority strengthened domestically through the civil war of the Fronde. This led to an absolute monarchy, where the Palace of Versailles was reimagined as a symbol of royal power and surveillance. The borders of France expanded under Louis XIV's reign. Meanwhile, conflicts between the English monarch and Parliament escalated, ultimately leading to the English Civil War and the decline of the English monarchy's dominance. Scientific breakthroughs characterized this era, with key figures such as Galileo Galilei, Johannes Kepler, René Descartes, and Isaac Newton making major contributions. The development of logarithms, electricity, telescopes, microscopes, calculus, and universal gravitation marked significant advancements in scientific knowledge. Cultural growth also occurred during this time, with notable developments in theater, music, visual arts, and philosophy. Some of the greatest inventions emerged from this period, including those that laid the groundwork for European colonization of the Americas and Southeast Asia. The Islamic world saw the rise of powerful gunpowder empires, such as the Ottoman, Safavid, and Mughal, while in southern India, the decline of the Deccan Sultanates and extinction of the Vijayanagara Empire took place. The Dutch established a presence in Ceylon, marking the beginning of their colonization efforts. The 17th century witnessed significant shifts in global politics, trade, and culture. One of the most notable events was the Treaty of Karlowitz, which marked the first major Ottoman territorial loss in Europe by ceding most of Hungary to the Habsburgs in 1699. Meanwhile, Tokugawa Ieyasu established the Tokugawa shogunate in Japan at the beginning of the century, initiating the Edo period, a time of relative isolationism that lasted until the 19th century. In China, the Ming dynasty was crumbling under the pressure of the Manchu warlord Nurhaci's conquests. His son Hong Taiji and grandson, the Shunzhi Emperor, further solidified Qing dominance, establishing the Qing dynasty. However, this period saw significant economic challenges for Qing China due to civil wars between Qing forces and former Ming loyalists. The 17th century was also marked by major military conflicts such as the Thirty Years' War, Dutch–Portuguese War, Great Turkish War, Nine Years' War, Mughal–Safavid Wars, and the Qing annexation of the Ming. These conflicts shaped the global landscape and had far-reaching consequences for centuries to come. The early 17th century was marked by significant events in history, including the Defenestration of Prague and the Bohemian Revolt, which led to the Thirty Years' War. Meanwhile, the Manchus invaded China, toppling the Ming dynasty, while European slaving reached America with the first Africans being brought to present-day United States. The Dutch East India Company's victory over Jayakarta in 1619 led to the destruction of the city and the establishment of Batavia as its new headquarters. In Poland, the Polish-Ottoman War over Moldavia resulted in a disaster for the Polish at Cecora on the River Prut. The Mayflower set sail from Plymouth, England in 1620, marking the beginning of English colonization in New England. The Battle of Chocim saw Poles and Cossacks under Jan Karol Chodkiewicz defeat the Ottomans, while the Jamestown massacre resulted in the deaths of 347 English settlers outside Jamestown, Virginia. In France, Cardinal Richelieu centralized power, completing St. Peter's Basilica and overseeing a period of relative peace. The Aurochs went extinct in 1627, while Sultan Agung of Mataram launched a failed campaign to conquer Dutch Batavia. The Safavid king, Abbas I, died in 1629, and Cardinal Richelieu allied with Swedish Protestant forces to counter Ferdinand II's expansion. In India, Shivaji was born in 1630, later founding the Maratha Empire in 1674. Mount Vesuvius erupted in 1631, while Galileo Galilei arrived in Rome for his trial before the Inquisition in 1633. Japan became "locked country" from 1633 to 1639, and the Qing dynasty attacked the Joseon dynasty in 1637. The Republic of the United Provinces fleet defeated a Spanish fleet at the Naval Battle of the Downs in 1639. Disagreements between the Farnese and Barberini Pope Urban VIII escalated into the Wars of Castro until 1649. The Portuguese Restoration War led to the end of the Iberian Union, while the Irish Rebellion took place in 1641. René Descartes published Meditationes de prima philosophia, and the English Civil War began in 1642, ending with the execution of King Charles I and the establishment of Parliament's supremacy. The 17th century was marked by significant events that shaped the course of history, including the capture of Crete by the Ottomans from the Venetians, the execution of King Charles I for high treason, and the Cromwellian conquest of Ireland. This period also saw the rise of new powers such as Sweden, the Maratha Empire, and China. The Night Watch, a famous painting by Rembrandt, captures the essence of this era, depicting the Militia Company of Captain Frans Banning Cocq in 1642. The English Civil War ended with Parliamentarian victory at the Battle of Worcester in 1651, marking a significant turning point in English history. In India, Sambhaji, the second King of the Maratha Empire and eldest son of King Shivaji, was born in 1657. Shivaji's own life took a dramatic turn when he killed Adil Shahi dynasty's general Afzal Khan at Pratapgad fort on 9 November, 1659. The Commonwealth of England came to an end in 1660, and the monarchy was restored during the English Restoration. The Royal Society, founded in 1660, played a crucial role in shaping scientific knowledge. Robert Hooke's discovery of cells using a microscope in 1665 marked a significant breakthrough in biology. Portugal defeated the Kongo Empire at the Battle of Mbwila in 1665, while Robert La Salle claimed all the land east of the Mississippi River for France in 1682. The Great Fire of London occurred in 1666, and Shivaji visited Aurangzeb at Agra Fort to force him into house arrest. The Raid on the Medway during the Second Anglo-Dutch War took place in 1667, while the War of Devolution brought an end to French invasion of the Netherlands. The Great Turkish War halted the Ottoman Empire's expansion into Europe from 1672-1699. John Sobieski defeated the Ottomans at the second battle of Khotyn in 1673. The Third Anglo-Dutch War was fought between England and the United Provinces, while France initiated the Franco-Dutch War. The Pueblo Revolt drove the Spanish out of New Mexico until 1692, and Prince Sambhaji crowned himself as the second Chatrapati of Maratha Empire in 1680. The Treaty of Nijmegen ended various interconnected wars among multiple European powers in 1678. Claiming Louisiana for France in 1682 marked a significant moment in American history. China conquered the Kingdom of Tungning and annexed Taiwan in 1683, while the Ottoman Empire was defeated in the second Siege of Vienna. The Great Turkish War led to the conquest of most of Ottoman Hungary by the Habsburgs from 1683-1699.The 17th century was a transformative period marked by significant events in politics, philosophy, science, and technology. The Ottoman Turks regained control of Skopje, North Macedonia, following Karposh's death and defeat of the rebels. The Seventeenth Century: A Time of Great Discovery and Transformation In the seventeenth century, human knowledge and understanding underwent a significant transformation, marked by major breakthroughs in various fields. Christiaan Huygens, a Dutch scientist, made notable contributions to the development of timekeeping with his first functional pendulum clock in 1657, building upon the learnings of Galileo Galilei. The observation of surface details on Mars by Christiaan Huygens in 1659 marked an important milestone. Meanwhile, Christopher Merret presented the first paper on the production of sparkling wine in 1662, while James Gregory published designs for a reflecting telescope in 1663. These innovations paved the way for further advancements. The construction of the first known operational reflecting telescope by Isaac Newton in 1669 was a significant turning point. This marked the beginning of a new era in astronomy and paved the way for future discoveries. In the realm of biology, Antonie van Leeuwenhoek discovered bacteria in 1676, making him one of the earliest scientists to study microorganisms. The measurement of the speed of light also took place during this time, with the first recorded measurements made in 1676. The development of the binary system by Gottfried Wilhelm Leibniz in 1679 laid the foundation for modern mathematics and computer science. Furthermore, calculus emerged independently as a distinct field of study, developed concurrently by both Leibniz and Sir Isaac Newton. These significant discoveries and advancements had a profound impact on various aspects of human life, from science and technology to trade and state power. The seventeenth century was a time of great transformation, marked by major breakthroughs that laid the foundation for many of the technological advancements we enjoy today. paraphrased text here The finite difference method is used to approximate derivatives at each grid point. This involves replacing derivatives with differential factors that can be evaluated using Taylor series expansion properties. By doing so, finite differences can be made possible. For a simple geometry, such as point (x)i and function ‘u’, the derivative can be represented as: $$\frac{\partial u}{\partial x_i} = \frac{u_{i+1}-u_{i-1}}{2\Delta x}$$ The idea behind replacing derivatives with differential factors is that by identifying small truncation/ discretization errors, accurate results can be obtained. From the above equation, if we remove the limit, a finite difference approximation can be achieved. FDM uses Taylor series expansion properties to make this approximation possible. For the function of u when Δx>0, Here, H is the higher-order term. The above equation can be reiterated as: $$\frac{\partial u}{\partial x_i} = \frac{u_{i+1}-u_{i-1}}{2\Delta x} - \frac{\Delta t^2}{12}\left(\frac{\partial^3u}{\partial x_i^3}\right) + O(\Delta t^3)$$ With the above equations, at point i, the finite difference formula can be written as: $$\frac{\partial u}{\partial x_i} = \frac{u_{i+1}-2u_i+u_{i-1}}{\Delta x^2} + O(\Delta t)$$ In order to minimize the truncation error, Δx has to be smaller. However, note that not all approximations with finite difference methods yield a precise numerical solution. For this reason, it is necessary to take stability and convergence into account. Applying the Finite Difference Method to the Heat Transfer Equation In the development of a CFD model, numerical computing allows for solving complex heat transfer problems. With the finite difference method, the discretized governing equation can be presented in the form of a heat equation. By doing this, one can identify the temperature distribution within the system. The first step is to generate the grid by replacing the object with the set of finite nodes. The second-degree heat equation for 2D steady-state heat generation can be expressed as: $$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = \frac{q'}{\kappa}$$ Now, using Taylor series expansion on the grid, at temperature T(m,n), the above heat equation can be written for grid spacing Δx and Δy as: For uniform grid spacing, Δx=Δy, The heat flux q' can be calculated using Fourier's law for heat conduction. The equation is used to identify the temperature value at each grid point. Solving for Finite Difference Method Heat Transfer Problems Numerical evaluation of finite difference method heat transfer problems can be a challenge given the different geometries and boundary conditions. However, CFD solvers can help you attain the best simulation by helping you adjust the grid point for optimized meshing. Through properly defined boundary conditions, discretization, approximation, and numerical analysis, CFD solvers can make heat transfer problems easier.