
Professional Certificate in Port and Waterway Engineering

Coastal Hydrodynamics

Absorption coefficient refers to the measure of how much energy is lost as a wave travels through a medium, such as water, due to friction and other forces. In the context of Coastal Hydrodynamics, absorption coefficient is crucial in understanding how waves interact with the coastline and the seabed. Related terms include transmission coefficient and reflection coefficient. The absorption coefficient is an important concept in the Professional Certificate in Port and Waterway Engineering as it helps engineers design and optimize coastal structures, such as seawalls and breakwaters, to minimize energy loss and maximize their effectiveness.

Advection is the process by which water or other substances are transported through a medium, such as the ocean, due to the movement of the medium itself. In Coastal Hydrodynamics, advection plays a crucial role in the transport of sediments, nutrients, and other substances along the coastline. Related terms include diffusion and dispersion. Advection is a key concept in understanding coastal processes such as longshore currents and rip currents. For example, advection can lead to the accumulation of sediments in certain areas, resulting in the formation of beaches and dunes.

Amplitude refers to the maximum height of a wave, measured from its equilibrium position. In Coastal Hydrodynamics, amplitude is an important parameter in understanding wave behavior and its impact on coastal structures and processes. Related terms include wavelength and period. The amplitude of a wave can have significant effects on coastal erosion and deposition, with larger amplitude waves typically resulting in more erosion and less deposition.

Artificial reefs are human-made structures designed to mimic the effects of natural reefs in reducing wave energy and promoting coastal stability. In Coastal Hydrodynamics, artificial reefs can be used to protect coastal communities and infrastructure from wave action and erosion. Related terms include seawalls and breakwaters. Artificial reefs can be designed to promote biodiversity and provide habitat for marine species, making them a popular choice for coastal management and conservation efforts.

Beach nourishment is the process of replenishing sediments on a beach to restore its natural profile and promote coastal stability. In Coastal Hydrodynamics, beach nourishment can be used to mitigate the effects of erosion and promote deposition. Related terms include beach restoration and coastal replenishment. Beach nourishment can be achieved through the use of dredged materials or the placement of geotubes to trap sediments and promote accretion.

Breakwaters are coastal structures designed to reduce wave energy and protect coastal communities and infrastructure from wave action and erosion. In Coastal Hydrodynamics, breakwaters can be used to promote coastal stability and reduce the risk of flooding. Related terms include seawalls and artificial reefs. Breakwaters can be designed to allow for the passage of water and sediments, making them a popular choice for coastal management and conservation efforts.

Buoyancy refers to the upward force exerted on an object by a fluid, such as water, due to the difference in density between the object and the fluid. In Coastal Hydrodynamics, buoyancy plays a crucial role in the behavior of coastal structures and processes, such as the movement of sediments and the stability of coastal features. Related terms include density and viscosity. Buoyancy can affect the transport of sediments and the formation of coastal landforms, such as beaches and dunes.

Coastal currents refer to the movement of water along the coastline, driven by winds, tides, and other forces. In Coastal Hydrodynamics, coastal currents play a crucial role in the transport of sediments, nutrients, and other substances along the coastline. Related terms include longshore currents and rip currents. Coastal currents can have significant effects on coastal erosion and deposition, with stronger currents typically resulting in more erosion and less deposition.

Coastal erosion refers to the loss of land or sediments along the coastline, due to the action of waves, winds, and other forces. In Coastal Hydrodynamics, coastal erosion is a major concern, as it can result in the loss of property, infrastructure, and habitat. Related terms include coastal accretion and coastal stability. Coastal erosion can be mitigated through the use of coastal structures, such as seawalls and breakwaters, and through the implementation of coastal management and conservation efforts.

Coastal management refers to the planning and implementation of strategies to protect and conserve coastal resources and ecosystems. In Coastal Hydrodynamics, coastal management involves the use of coastal structures, such as seawalls and breakwaters, as well as non-structural measures, such as beach nourishment and dune restoration. Related terms include coastal conservation and coastal sustainability. Coastal management requires a comprehensive understanding of coastal processes and systems, as well as the impacts of human activities on the coastal environment.

Coastal stability refers to the ability of the coastline to resist erosion and maintain its natural profile over time. In Coastal Hydrodynamics, coastal stability is influenced by a range of factors, including wave energy, tides, and sediment supply. Related terms include coastal erosion and coastal accretion. Coastal stability is critical for the protection of coastal communities and infrastructure, as well as the conservation of coastal ecosystems and habitats.

Diffusion refers to the process by which substances or energy are dispersed through a medium, such as water, due to molecular motion. In Coastal Hydrodynamics, diffusion plays a crucial role in the transport of sediments, nutrients, and other substances along the coastline. Related terms include advection and dispersion. Diffusion can affect the distribution of sediments and the formation of coastal landforms, such as beaches and dunes.

Dispersion refers to the spreading of waves or other disturbances as they travel through a medium, such as water. In Coastal Hydrodynamics, dispersion plays a crucial role in the behavior of coastal waves and the formation of coastal landforms. Related terms include refraction and diffraction. Dispersion can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Dunes are coastal landforms formed by the accumulation of sediments, typically sand, due to the action of

winds and waves. In Coastal Hydrodynamics, dunes play a crucial role in protecting coastal communities and infrastructure from wave action and erosion. Related terms include beaches and coastal barriers. Dunes can be designed and managed to promote coastal stability and reduce the risk of flooding, making them a popular choice for coastal management and conservation efforts.

Erosion refers to the loss of land or sediments due to the action of waves, winds, and other forces. In Coastal Hydrodynamics, erosion is a major concern, as it can result in the loss of property, infrastructure, and habitat. Related terms include deposition and sedimentation. Erosion can be mitigated through the use of coastal structures, such as seawalls and breakwaters, and through the implementation of coastal management and conservation efforts.

Fetch refers to the distance over which winds blow without interruption, generating waves and influencing coastal processes. In Coastal Hydrodynamics, fetch is an important parameter in understanding wave behavior and its impact on coastal structures and processes. Related terms include wave height and wave period. Fetch can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Geoengineering refers to the use of engineering techniques to manipulate and control geological processes and systems. In Coastal Hydrodynamics, geoengineering can be used to mitigate the effects of erosion and promote coastal stability. Related terms include coastal management and coastal conservation. Geoengineering can involve the use of structures such as seawalls and breakwaters, as well as non-structural measures, such as beach nourishment and dune restoration.

Geotubes are coastal structures designed to trap sediments and promote accretion and stability along the coastline. In Coastal Hydrodynamics, geotubes can be used to mitigate the effects of erosion and promote coastal stability. Related terms include beach nourishment and dune restoration. Geotubes can be designed to allow for the passage of water and sediments, making them a popular choice for coastal management and conservation efforts.

Hydrodynamics refers to the study of the behavior of fluids, such as water, in motion. In Coastal Hydrodynamics, hydrodynamics plays a crucial role in understanding coastal processes and systems, such as waves, tides, and currents. Related terms include coastal engineering and oceanography. Hydrodynamics is essential for the design and optimization of coastal structures, such as seawalls and breakwaters, and for the implementation of coastal management and conservation efforts.

Infragravity waves are low-frequency waves that are generated by the interaction of waves with the coastline. In Coastal Hydrodynamics, infragravity waves play a crucial role in the behavior of coastal processes and systems, such as erosion and deposition. Related terms include gravity waves and seiches. Infragravity waves can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Longshore currents are coastal currents that flow parallel to the coastline, driven by the action of waves and winds. In Coastal Hydrodynamics, longshore currents play a crucial role in the transport of sediments and the formation of coastal landforms, such as beaches and dunes. Related terms include rip currents and

coastal circulation. Longshore currents can have significant effects on coastal erosion and deposition, with stronger currents typically resulting in more erosion and less deposition.

Morphodynamics refers to the study of the dynamic interaction between coastal processes and landforms, such as beaches and dunes. In Coastal Hydrodynamics, morphodynamics plays a crucial role in understanding the behavior of coastal systems and the impacts of human activities on the coastal environment. Related terms include coastal geology and geomorphology. Morphodynamics is essential for the design and optimization of coastal structures, such as seawalls and breakwaters, and for the implementation of coastal management and conservation efforts.

Nearshore hydrodynamics refers to the study of the behavior of water and sediments in the nearshore zone, where the water is shallow and the waves are strongly influenced by the coastline. In Coastal Hydrodynamics, nearshore hydrodynamics plays a crucial role in understanding coastal processes and systems, such as waves, tides, and currents. Related terms include coastal engineering and oceanography. Nearshore hydrodynamics is essential for the design and optimization of coastal structures, such as seawalls and breakwaters, and for the implementation of coastal management and conservation efforts.

Oceanography refers to the study of the ocean and its processes, including coastal hydrodynamics. In Coastal Hydrodynamics, oceanography plays a crucial role in understanding the behavior of coastal systems and the impacts of human activities on the coastal environment. Related terms include coastal engineering and geomorphology. Oceanography is essential for the design and optimization of coastal structures, such as seawalls and breakwaters, and for the implementation of coastal management and conservation efforts.

Refraction refers to the bending of waves as they travel through a medium, such as water, due to changes in depth or velocity. In Coastal Hydrodynamics, refraction plays a crucial role in the behavior of coastal waves and the formation of coastal landforms, such as beaches and dunes. Related terms include diffraction and dispersion. Refraction can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Rip currents are strong, narrow currents that flow outward from the coastline, often in response to the action of waves and winds. In Coastal Hydrodynamics, rip currents play a crucial role in the transport of sediments and the formation of coastal landforms, such as beaches and dunes. Related terms include longshore currents and coastal circulation. Rip currents can have significant effects on coastal erosion and deposition, with stronger currents typically resulting in more erosion and less deposition.

Sediment transport refers to the movement of sediments through a medium, such as water, due to the action of waves, winds, and other forces. In Coastal Hydrodynamics, sediment transport plays a crucial role in the formation of coastal landforms, such as beaches and dunes. Related terms include erosion and deposition. Sediment transport can be affected by a range of factors, including wave energy, tides, and sediment supply.

Seiches are standing waves that form in coastal bays and harbors due to the resonance of waves with the geometry of the coastline. In Coastal Hydrodynamics, seiches play a crucial role in the behavior of coastal processes and systems, such as waves, tides, and currents. Related terms include infragravity waves and

gravity waves. Seiches can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Shoreline management refers to the planning and implementation of strategies to protect and conserve coastal resources and ecosystems. In Coastal Hydrodynamics, shoreline management involves the use of coastal structures, such as seawalls and breakwaters, as well as non-structural measures, such as beach nourishment and dune restoration. Related terms include coastal conservation and coastal sustainability. Shoreline management requires a comprehensive understanding of coastal processes and systems, as well as the impacts of human activities on the coastal environment.

Tides refer to the periodic rising and falling of the sea level due to the gravitational force of the moon and sun on the ocean. In Coastal Hydrodynamics, tides play a crucial role in the behavior of coastal processes and systems, such as waves, currents, and sediment transport. Related terms include tidal range and tidal currents. Tides can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Wave energy refers to the energy transferred from the wind to the waves as they travel through the ocean. In Coastal Hydrodynamics, wave energy plays a crucial role in the behavior of coastal processes and systems, such as erosion and deposition. Related terms include wave height and wave period. Wave energy can affect the shape and orientation of coastal features, such as beaches and dunes, as well as the stability of coastal structures, such as seawalls and breakwaters.

Wave height refers to the vertical distance between the crest and trough of a wave. In Coastal Hydrodynamics, wave height is an important parameter in understanding wave behavior and its impact on coastal structures and processes. Related terms include wave energy and wave period. Wave height can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.

Wave period refers to the time it takes for a wave to complete one cycle, from crest to crest or trough to trough. In Coastal Hydrodynamics, wave period is an important parameter in understanding wave behavior and its impact on coastal structures and processes. Related terms include wave energy and wave height. Wave period can affect the energy and frequency of waves, as well as the shape and orientation of coastal features, such as beaches and dunes.