| 海洋能 | Ocean Energy |
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| 10.1 一般名詞 | 10.1 General Terms |
| 10.1.1 海洋能<br>為一種能源，可藉著利用海洋之物理或化學特性的形式而得，計有潮汐、波浪、熱梯度、鹽梯度及洋流等。<br>（註）為一種能滿足消費需求的能源，此等形式的海洋能為既有之供給能源所補充或補充進既有的供給能源中，或為一能源貯存系統所收集。 | 10.1.1 Ocean energy<br>The energy that may be harnessed by exploiting an aspect of the physical or chemical. Characteristics of oceans, namely, tidal movement, wave motion, thermal gradients, salinity gradients, ocean currents.<br>Note As a source of power to meet consumer demand these forms of ocean energy would normally be supplemented by or supplemental to a firmer source of energy supply, or buffered by an energy storage system. |
| 10.2 潮汐能 | 10.2 Energy by Tidal Movement |
| 10.2.1 潮汐能<br>為一種利用水位變化所產生之位能及水流所產生的動能（潮流能）而獲得之有效的能源。此等存在於潮汐之能量歸因於太陽、月亮與地球間所存在的引力與其間轉動關係。<br>（註）潮汐發電廠見 3.1.6。 | 10.2.1 Tidal energy<br>The energy that can be usefully recovered by exploiting the potential energy due to the vertical displacement of mass from still water level or the kinetic energy due to currents (tidal current energy), both caused by the ebb and flow (fall and rise) of the tides. The energy present in the tides is attributable to gravitational forces due to the moon and sun in association with the rotation of the Earth.<br>Note For tidal power station see 3.1.6. |
| 10.2.2 潮差<br>介於鄰接高潮位與低潮位之水位差距。 | 10.2.2 Tidal range<br>The difference in levels between successive high and low waters due to tides. |

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| 10.2.3 潮增幅<br>潮波向陸地前進，進入逐漸變淺的水域時之變形及因波在岸邊由於反射而增強之前進波的關係，使得岸邊的潮差大於外海的一種效應；此兩種效應皆對潮波振幅有所影響，潮增幅之大小可能為海岸之天然或人工因素而影響，但不會因某一潮波而將增輻附加於另一潮波上。 | 10.2.3 Tidal amplification<br>An effect whereby the tidal range at the coast becomes greater than the tidal range in the open sea, due to the waves advancing landwards becoming deformed as they enter progressively shallower waters and due to waves reflected at the coast reinforcing the advancing waves; both effects contribute to tidal amplification which may be influenced in its extent by the natural shape of the coast or by artifacts, but is not attributable to the superimposition of one tide upon another. |
| 10.2.4 海灣共振<br>因海灣構造與潮之波長的配合所發生的共振，造成海灣之潮差可能大於外海潮差之效應，此時海灣之自然自由頻率與潮汐之振盪頻率一致；此種系統除了潮汐能外無其他之能源。<br>（註）海灣共振及潮增幅可能相伴發生。 | 10.2.4 Estuary resonance; bay resonance<br>The effect whereby the tidal range in an estuary or bay may become greater than the tidal range in the open sea due to resonance occurring when the configuration of the estuary or bay matches the wavelength of the tide, so that a natural free oscillation frequency of the estuary or bay accords with the oscillation frequency of the tide, the system having no other source of energy than the tide.<br>Note Estuary resonance or bay resonance and tidal amplification can occur in combination. |
| 10.2.5 潮堰<br>位在橫過海灣或海口的蓄水工 程，設計為收集流入潮水於海盆內。海盆一方面可由蓄水工程，另一方面可由上游海口或海灣海岸所形成。堰之建造可能形成兩個分離的海盆，如此利用更用彈性，所能得到的潮汐能更多。 | 10.2.5 Tidal barrage<br>Retaining works located across a bay or estuary and designed to impound incoming tidal water in the basin or basins formed by the retaining works on the one hand and the upstream estuary or coast of the bay on the other hand. The barrage may be constructed so as to form two separate basins whereby more flexible exploitation of the tidal energy may be obtained. |

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| 10.2.6 蓄水灣<br>由堰所構成的海盆，可容許侵入的潮汐，由垂直障礙物而生的反射波，或抽泵系統所得之水流入，儲存其中，直到海盆內水位有足夠高差以便產生電力。 | 10.2.6 Storage basin<br>A basin formed by the construction of a barrage into which water from an incoming tide, from waves reflected by a vertical barrier or from a pumping system is allowed to flow, is impounded and stored until such time as the head between the level of the water in the basin and that outside the basin is sufficient to enable useful energy to be produced from it. |
| 10.2.7 浮式潮汐電廠<br>裝置在一錨定之浮動設施上，藉著使用水輪、螺旋，或低水頭水輪機而利用退潮、漲潮時水動能之電廠。 | 10.2.7 Floating tidal plant<br>A plant that is installed on an anchored floating base and exploits the kinetic energy of the tidal ebb and flow with the aid of water wheels, screws or low head water turbines. |
| 10.2.8 潮渠<br>為一可輸送潮水至水力運作機器或蓄水灣的渠道。 | 10.2.8 Tidal race<br>A channel conveying tidal water to (or from) a hydraulically operated machine or impounding basin. |
| 10.2.9 潮汐電廠之尖載運轉<br>在計劃體系之運轉電力供應系統中，使用潮汐發電體系的儲存設備以供應其尖峯電力需求之使用方式。 | 10.2.9 Peak load operation of tidal power station<br>The use of the storage facilities of a tidal power scheme to enable it to be used to contribute to meeting peak power demand on the electricity supply system within a planned scheme of operation. |

| 10.3 波浪能 | 10.3 Energy by Wave Motion |
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| 10.3.1 波能<br>波中的總能量為流體異於靜止水面之位能及運動水粒子動能的和。波能為由風而來，而風又是因太陽能所產生。<br>（註）波之動力可由如下式子估計：<br>$\frac{H_S^2 T_e}{2}$瓩／米波峯寬<br>其中 Hs 為由波高米數（由波峯與波谷測得），等於一般由 20 分鐘取樣之水面變化均方根的四倍，Te 為波浪周期（單位秒），由取樣資料所求出之能譜估計而得（見 10.3.2 之註解）。 | 10.3.1 Wave energy<br>The total energy in a wave is the sum of the potential energy of the fluid displaced from still water level and the kinetic energy of the moving water particles. Wave energy is attributable to wind forces, which in turn are due to solar energy.<br>Note the power in waves may be calculated approximately as:<br>$\frac{H_S^2 T_e}{2}$ Kilowatts per metre of wave front<br>where Hs is the significant wave height (measured from crest to trough)in metres (=4 times the root mean square surface elevation during a sample measurement, often of approximately 20 minutes) and Te is the energy period in seconds, calculated from the energy spectrum derived from sample measurements.<br>(See note to 10.3.2) |

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| 10.3.2 波能譜<br>由一取樣資料（通常為 20 分鐘）所得波浪特性之描述。<br>（註）通常以分佈之方式表示，以波頻（f）為橫座標；而以一小頻率範圍之能量「E（f）」為縱座標。二維或方向波譜需另加波向之因子（θ），而波譜動量對於波浪之特性之措述非常重要；第 n 個動量（Mn）定義為：<br>$\int_0^\infty f^n E(f)df$<br>Hs（見 10.13.1）定義為 $4\sqrt{}$Mu，而 T 為 $M_{-1}/M_0$。波之功率為 $7.82M_{-1}$ 瓩 ／米波峯寬。（進一步之應用統計數學計算波能的資料見美國能源部 1979 年第 42 號能源報告—Wave Eenrgy。 | 10.3.2 Wave energy spectrum<br>A description of the wave climate during a sample measurement (often approximately 20 minutes).<br>Note Usually presented as a distribution, with wave frequency (f) as the abscissa and energy-in-a-small-frequency-range (E(f)) as the ordinate. A two-dimensional or directional spectrum has an additional dimension for the direction of the waves (θ). The moments of the spectrum are of particular importance in characterizing the wave climate; the n-th moment (Mn)is defined as:<br>$\int_0^\infty f^n E(f)df$<br>Hs (see 10.3.1)is defined as $4\sqrt{}$Mu and Te as $M_{-1}/M_o$. The power in waves is thus 7.82 $M_{-1}$ kilowatts per metre of wave front. (For further information on the application of statistical mathematics to wave energy calculations see “Wave Energy”, Department of Energy, Energy Paper No. 42,1979) |
| 10.3.3 風浪<br>波能譜之一部份，由當地風所造成的。 | 10.3.3 Sea (or Wind sea)<br>That part of a wave energy spectrum containing waves which were generated by the wind that is working on them (i.e. which were generated recently in time and locally in space). |

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| 10.3.4 湧浪<br>波能譜的一部份，非當地風所造成，湧浪通常來自遠處所產生的波源且通常存在於波能譜低頻部的一狹窄頻帶中。 | 10.3.4 Swell<br>The part of a wave energy spectrum containing waves which have escaped the influence of the wind which generated them. As swell is normally advected from more distant generating sources, it normally falls in a narrow frequency band in the lower frequency part of the spectrum. |
| 10.3.5 波峯長度<br>在垂直於波的傳播方向上測量到的兩相鄰波峯間的距離。 | 10.3.5 Crest length<br>The distance between adjacent wave crests, measured perpendicular to the direction of propagation. |
| 10.3.6 波鋒面<br>為一垂直於波之傳播方向以波的相速度移動的想像面。實際的波浪可考慮由許多波鋒面所組成，但其中一些（非全部）可能以相同的方向傳播。 | 10.3.6 Wave front<br>An imaginary surface perpendicular to the direction of wave propagation and moving at the phase velocity of the wave. Real seas may be considered as composed of a multitude of wave fronts, some but not all of which may be propagating in similar directions. |
| 10.3.7 波能裝置<br>一種設計來獲得波能以期轉換成有用能的裝置，此種能可能為電能或非電能，且可加以傳送至陸上或不可以傳送至陸上。 | 10.3.7 Wave energy device<br>A device designed to capture wave energy for conversion to useful energy, which may or may not be electrical energy and may or may not be transmitted to shore. |
| 10.3.8 波能發電機<br>為一種吸收波能裝置，能轉換抽取波能為電能。 | 10.3.8 Wave-powered generator<br>A wave energy extraction device that converts the energy extracted into electrical energy. |
| 10.3.9 波能氣輪機<br>一種被設計經由空氣作為媒介用以從波浪之運動或壓力中抽取能源的渦輪機／發電機。 | 10.3.9 Wave energy air turbine<br>A turbine/electric generator that uses as working fluid air compressed by the pneumatic system designed to extract energy from the movements or pressures of sea waves. |

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| 10.3.10 低水頭波能水輪機<br>一種被設計來操作大量低位能之水，如潮汐能或波峯與波谷間之高度差的渦輪機。 | 10.3.10 Low-head wave energy water turbine<br>Turbines designed to operate on large volumes of water of low potential energy, such as tidal energy or the height difference between a wave crest and trough. |
| 10.3.11 點吸收器<br>為一種波能裝置，可吸收各方向的能，且各方向之效率約相等，而此種吸收器之大小較平均波長為小。<br>（註）雖然線性波浪理論能推知點吸收器可從較其本身寬數倍的波鋒面上抽取能量，但目前尚無可能發展一套實用的系統。此乃因線性理論僅適用於很小振幅之波浪，而此小振幅波浪，對波能轉換而言並不動要。 | 10.3.11 Point absorber<br>A wave energy device which can absorb energy from all directions simultaneously with approximately equal efficiency and which is small in comparison with the mean wave length. Note Although linear theory would predict that a point absorber extracts energy from a wave front many times its own width, it has not yet been possible to develop a practical system that does so. This is because non-linear behaviour invalidates the theory for all but very small wave amplitudes, which are not of interest in wave energy conversion. |
| 10.3.12 海鴨子<br>為一波能裝置，在一長形的圓柱形龍骨上，裝置有一系列的海鴨子，動力由龍骨上的海鴨子之相對運動而產生。 | 10.3.12 Duck<br>A wave energy device consisting of a long cylindrical spine on which a series of individual oscillating vanes (or ducks) are located; power is generated by the relative motion of the ducks oscillating about the spine. |
| 10.3.13 筏<br>為一波能裝置，由一連串鉸鏈相連的淺浮筒構成，動力係由相對的角運動產生。 | 10.3.13 Raft<br>A wave energy device consisting of a series of relatively shallow pontoons connected by hinges; power is generated by the relative angutm motion. |

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| 10.3.14 振盪水柱<br>為一波能裝置，基本上由無底而上部有小孔的盆狀物組成。波使得盆中的水柱產生振盪，誘使振盪空氣流經小孔而推動氣輪機。 | 10.3.14 Oscillating water column<br>Any wave energy device consisting essentially of a box with no bottom and an orifice in the top; waves cause the water column in the box to oscillate, inducing an oscillating air flow through the orifice and thus driving an air turbine. |
| 10.3.15 波能整流器<br>為一種錨錠式波能裝置，由一上、下水位貯槽構成。具有一單波谷時水由下水位貯槽流出兩槽間之流動可使低水頭渦輪機運作。 | 10.3.15 Wave energy rectifier<br>A seabed-mounted wave energy device incorporating upper and lower level reservoirs, with one-way flap valves arranged to allow water to flow into the upper reservoir from wave crests and out of the lower reservoir into wave troughs; the flow between the reservoirs operates a low-head turbine. |
| 10.3.16 可撓袋<br>為一種波能裝置，由充滿空氣的伸縮袋組成。伸縮袋連於正對波浪的潛式船體之上端，此船體包含由氣輪機相連之低、高壓導管，當波峯掃過袋面時空氣被排入高壓導管推動氣輪機；當波谷通過袋下方時空氣經由低壓導管充入袋中。 | 10.3.16 Flexible bag<br>A wave energy device consisting of air filled, flexible bags attached to the top of a submerged hull lying head on to the sea, which contains high and low-pressure duct; in wave troughs the bags refill with air from the low-pressure duct. |
| 10.3.17 波力負載<br>波浪施於潛式或半潛式之結構物上之力，以作為結構抗波力之設計基礎。 | 10.3.17 Wave loading<br>The forces exerted by wave on submerged and semi-submerged structures calculated to form a basis for the design of structures to withstand wave forces. |
| 10.3.18 結構反應<br>波能抽取裝置結構對波浪之運動或壓力的反應靈敏度，從而自波浪吸取能量。 | 10.3.18 Structural response<br>The sensitivity of the structure of a wave energy extraction device in responding to, and hence in extracting energy from, the movements or pressures of sea waves. |

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| 10.3.19 潮汐補償<br>因潮汐在波能抽取裝置之上引起水位改變的效應，所需採取之補償方法，特別是在收縮坡道系統及系統依靠在海床上連成其動力抽取設備之一部份時。 | 10.3.19 Tidal compensation<br>The measures requiring to be taken to compensate for the effect of the changes in sea level due to tides upon wave energy extraction devices, particularly in the case of converging channel ramp schemes and in schemes relying on a sea-bed connection as part of their power extraction mechanism. |
| 10.3.20 波聚集<br>在一特別區域內藉著利用某種方法（如潛式平板）將由較廣鋒面之波能以折射方法集中於某區域以增加該區域之波能的方法。 | 10.3.20 Wave focusing<br>A means of increasing the power of waves in a particular area by using some means (such as submerged plates) to concentrate the wave energy from a wider wave from into that area by refraction. |
| 10.4 洋流能 | 10.4 Energy by Ocean Currents |
| 10.4.1 水下洋流電廠<br>水中工廠結合輪子、推進器、降落傘狀物，設計來獲取水中洋流之能量並將其轉換成有用能源的電廠 | 10.4.1 Underwater ocean current plants: underwater mills<br>Plants incorporating wheels, propellers or “parachutes” , designed to harness the energy available in underwater ocean currents and convert it into useful energy. |
| 10.5 熱梯度能 | 10.5 Energy by Thermal Gradients |
| 10.5.1 海洋熱梯度<br>深部海水與表面海水之溫度差，一般約在 14~25ºC 之間。 | 10.5.1 Ocean thermal gradients<br>The temperature differences between deep ocean water and surface water. These may range from 14 to 25ºC. |
| 10.5.2 海洋熱能轉換（OTEC）<br>利用深部海水與表面海水之溫度差以產生有用之能。此溫差構成一熱系統可用來蒸發及冷凝某種工作流體，如氨或丙烷，以推動渦輪機或其他熱機。 | 10.5.2 Ocean thermal energy conversion (OTEC)<br>The exploitation of the temperature difference that exists between the surface and the depth of oceans to produce useful energy. Such a temperature difference constitutes a thermal system that can be used to vaporize and condense a working fluid such as propane or ammonia to drive a turbine or other heat engine. |

| 10.6 鹽梯度能 | 10.6 Energy by Salinity Gradient |
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| 10.6.1 鹽梯度能<br>在河川流入海洋於淡水和鹽水介面，或在不同鹽度水之介面，會產生滲透壓，可藉適合之半透膜來產生有用之能，或利用介面上之電化勢來直接產生電流。 | 10.6.1 Salinity gradient energy<br>At the interface of fresh and salt water where rivers enter the sea or at the interface of waters of different salinity, osmotic pressure occurs which may be exploited to provide useful energy by the application of suitably disposed semi-permeable membranes, for example, in the form of a closed cylinder. Alternatively, the electrochemical potential at the interface may be exploited to generate electric current directly. |