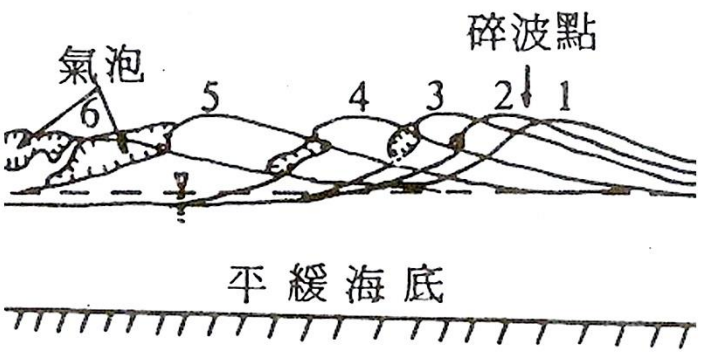
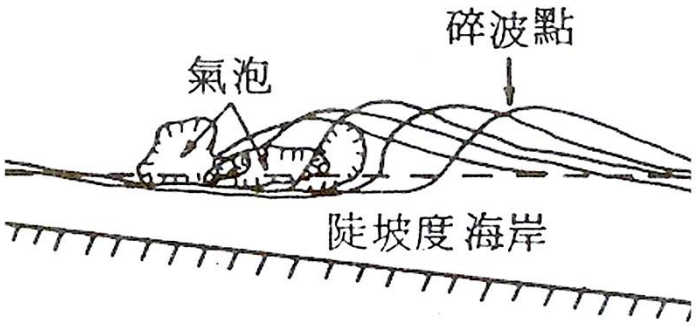
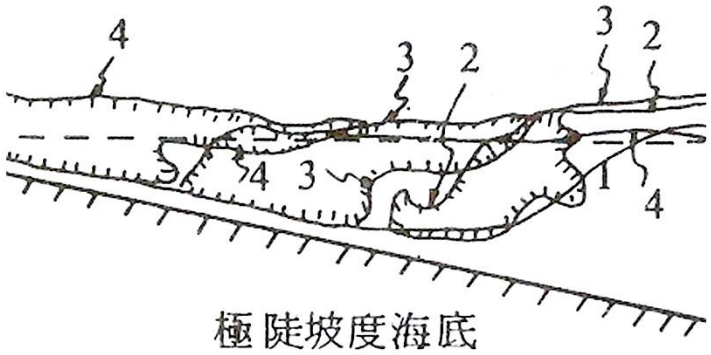
碎波形式(Types of breaker)



溢出波



捲入波



洶湧

碎波隨其碎波方式通常如圖，分類成 3 種:

(1) 溢出波(spilling breaker)

大波高的波沿緩坡度海底進行，波峰處首先出現白色泡沫，然後逐漸向波的前方展開而崩潰者為溢出波，特徵為波形的前後大致呈對稱，深海波的碎波大致屬之。

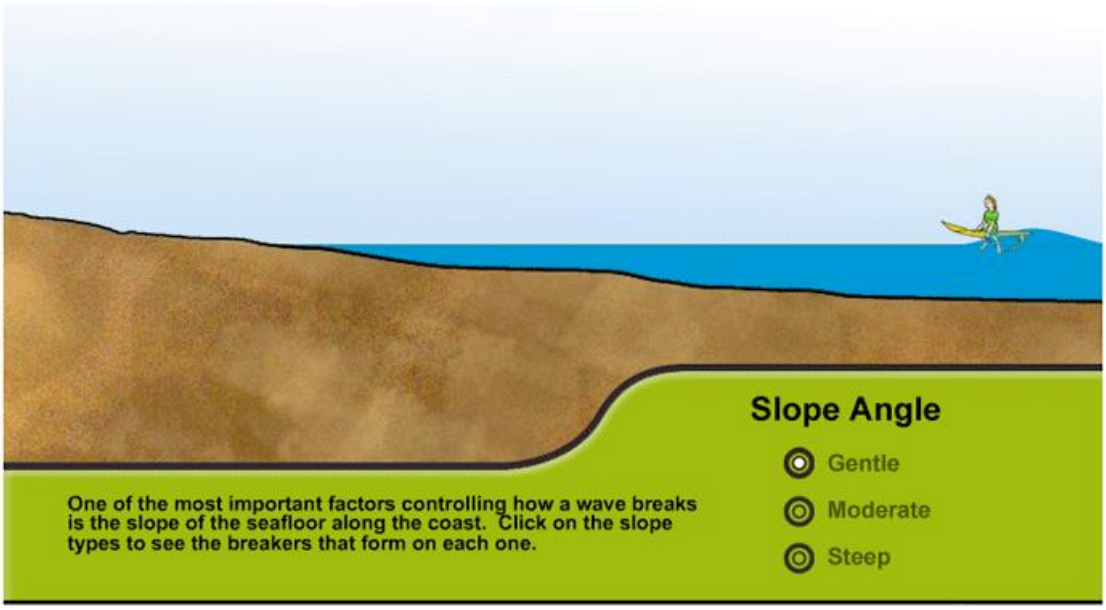
(2) 捲入波(plunging breaker)

當波形狀呈極為不對稱，前面坡度遠比後面者為大，波頭向前傾而將波前部分以捲入形式形成碎波者為捲入波。此型碎波通常發生在水深較淺、海底坡度較大海岸，碎波時波能量會一次被消耗，海底的砂會被捲入海水中使地形發生變化。

(3) 洶湧(surging breaker)

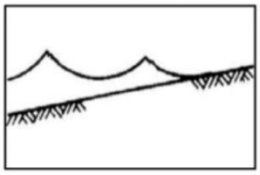
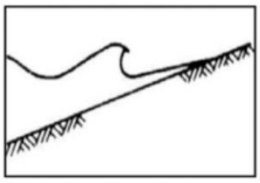
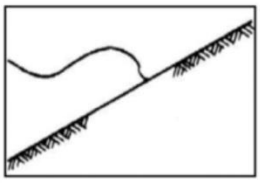
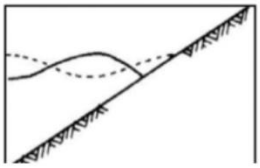
小波高的長波在大坡度海岸進行，波前面緩慢傾斜，只先端部分崩碎者為洶湧。

海底坡度與碎波形式的關係如下圖所示。



海底坡度與碎波形式（動畫）

Galvin 在 1968 年在捲入波與洶湧間增加一種崩潰波(collapsing breaker)，碎波發生位置比捲入波更靠近海岸線。

Type	Diagram	Example	Description
Spilling $\xi_0 < 0.5$			-Wave crest becomes unstable and spills down while introducing air bubbles inside. -Characteristic foamy water. -High-steepness waves over mild slopes.
Plunging $0.5 < \xi_0 < 2.5$			-Wave shoreward face becomes first vertical, curls over and finally plunges into the water ahead. -Air can be trapped inside the curl. -Medium steepness waves over intermediate slopes.
Collapsing $2.5 < \xi_0 < 3.7$			-Wave crest becomes vertical, until the base collapses arriving to the shoreline as a thin water layer. -Low steepness waves over steep slopes.
Surging $\xi_0 > 3.7$			-Wave crest remains unbroken, and the wave arrives to the shoreline with small shape changes. -Low steepness waves over very steep slopes.

摘自：https://inductiva.ai/blog/article/perspectives-on-the-sea-6

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