The Rouse number is defined as *ws*/(*κ* *u*∗), in which *ws* is the sediment fall velocity, *κ*=0.4 is the von Karman constant and *u∗* is the shear velocity.

Note that the shear velocity is related to the bed shear stress through *τb*= *u∗*|*u∗*|.

*For the situation of a large Rouse number (say larger than 2.5):*

|  |  |  |
| --- | --- | --- |
|  |  | the dominant mode is bed load transport : TRUE |
|  |  | the dominant mode is bed load transport : FALSE |
|  |  | the sediment shows a lagged response to the hydrodynamic conditions: TRUE |
|  |  | the sediment shows a lagged response to the hydrodynamic conditions: FALSE |

In order to estimate longshore bulk sediment transport rates, a coastal engineer uses aerial photographs - taken in subsequent years - of the accretion updrift of a long, shore-normal breakwater.

The photos show accretion that increases in volume over time and reaches up to the tip of the breakwater in all years.

There are no losses from the active profile in cross-shore direction.

*Do you expect his estimates to be of the right order of magnitude?*

|  |  |  |
| --- | --- | --- |
|  |  | Yes |
|  |  | No |
|  |  |  |

Two students have calculated sediment transport rates.

They both performed the calculation correctly.

However, student 1 has expressed the transport rates in volume of deposited material (in m3/m/s) and student 2 in immersed mass (in kg/m/s).

Student 2 found an answer (S2) that is related to the answer of Student 1 (S1) through:

S2=  \* S1

Tip: You can write the mathematical expression in the text box (e.g. 1/5\*3 is equivalent to 0.6 and both answers are accepted).

**Attention**: Use the point as a decimal separator!

Constants:

Water density: ρ=1000 kg/m3

Sediment density: ρs=2650 kg/m3

Porosity: p=0.4

Gravitational acceleration: g=9.81 m/s2

Inman and Bagnold (1963) derived a bulk longshore transport formula by applying the energetics concept to the littoral zone.

They expressed the bulk immersed weight longshore transport rate as:

https://mapleta-bsprod1.tudelft.nl:8443/mapleta/web/Cie4305000/Public_Html/Energetics_approach1.png  
   
in which *e* is an efficiency factor, *φb* is the wave angle of incidence at the breaker line, *μ = tanφ*  is the internal angle of repose of the sediment, *ûb*  is the orbital velocity amplitude just before breaking and *V* is a representative longshore current velocity.

Further, in the term *(Ecg)b* , *E* is the wave energy, *cg* the group velocity and the subscript *b* denotes that the term is evaluated at the breaker line.

*This formulation considers sediment:*

|  |  |  |
| --- | --- | --- |
|  |  | mobilised and transported by the combined wave-current motion |
|  |  | mobilised by the longshore current and transported by the combined wave and current motion |
|  |  | mobilised by the orbital wave motion and transported by the wave-induced longshore current |
|  |  | none of the other answers |
|  |  | mobilised by the wave-induced longshore current and transported by the skewed wave orbital motion |

*In a large oscillating wave tunnel the following phenomena can be simulated:*

|  |  |  |
| --- | --- | --- |
|  |  | sheet flow: TRUE |
|  |  | sheet flow: FALSE |
|  |  | Longuet-Higgins streaming: TRUE |
|  |  | Longuet-Higgins streaming: FALSE |
|  |  | ‘drift’ of suspended sediment: TRUE |
|  |  | ‘drift’ of suspended sediment: FALSE |

It may happen that at certain heights above the bed the net flux of sediment transported by the oscillatory motion is against the wave propagation direction.

*Which factors could contribute to such a situation:*

|  |  |  |
| --- | --- | --- |
|  |  | a rippled sediment bed: TRUE |
|  |  | a rippled sediment bed: FALSE |
|  |  | relatively coarse sediment: TRUE |
|  |  | relatively coarse sediment: FALSE |
|  |  | long wave periods: TRUE |
|  |  | long wave periods: FALSE |
|  |  | high turbulence levels: TRUE |
|  |  | high turbulence levels: FALSE |