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SPATIAL DAMAGE DISTRIBUTION OVER CUBE ARMOURED ROUNDHEADS

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INTRODUCTION

Different authors have studied and defined de most critical sector to armour stability in order to calculate the mass needed in the units of the armour. This sector has been located between 90° and 135° relative to the orthogonal of the waves. Moreover, from these studies it is seen that damage "moves" around the head keeping the position relative to the wave direction.

For the design of the head it is of interest to know, not only the damage development in the defined critical sector, but also the damage in the other parts of the roundhead. This presentation presents data on damage distribution over the head obtained in 3D physical model test. Further more, the factors influencing the distributions are explained.

MODEL TESTS

Port of La Coruña commissioned in the period 2002 to 2004 the Hydraulics and Coastal Engineering Laboratory of Department of Civil Engineering, Aalborg University, Denmark, to perform physical model tests of the stability of the cube armoured roundhead for the new port at Punta Langosteira, Spain. The tests, which were performed in a basin with multidirectional wave generators, included a parametric study of the influence of slope, radius and the mass density of the cubes as well as wave characteristics including angel of incidence.

DAMAGE DISTRIBUTION

Armour damage in the head is produced by the combined effects of the concentration of wave´s impact and the horizontal "swash" impact over the head. Moreover the relative lack of support from neighbour units displacement, produces easy damage compared to trunk sections.

The relative size of the head and the wave period influence the behaviour of the head. The spatial distribution on heads with relative large radius compared with armour unit´s size, is more concentrated in the critical sector than the case of smaller radius heads where damage is more spread over the head, even on the lee side.

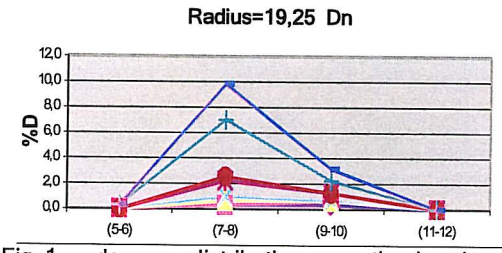

Fig 1.- damage distribution over the head, case cotg α=1,5; sop=0,05

The influence of wave period is that short waves produce more spread of the damage over the head due to larger stability associated and slower damage progression.

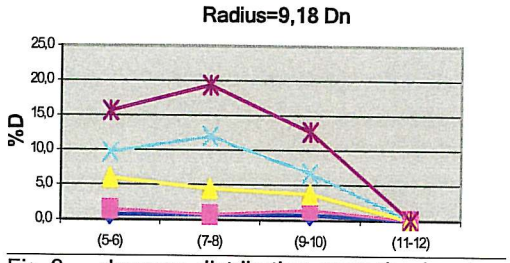

Fig 2.- damage distribution over the head, case cotg α=1,5; sop=0,05

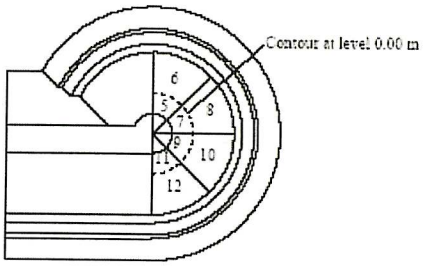

Fig 3.- sector used in the research

Fig 4.- head damage

The paper provides further recommendations for head design.

REFERENCES

Burcharth (2003): Report on model testing of rubble mound roundhead solutions (new port of La Coruña at Punta Langosteira), Hydraulic and coastal Engineering Laboratory, Aalborg University, Denmark.

Burcharth (2004): Parametric study of the round head for the new port of La Coruña at Punta Langosteira, Hydraulic and coastal Engineering Laboratory, Aalborg University, Denmark.

Burcharth, Haagensen, Maciñeira (2003): Stability of roundheads armoured with cubes, Coastal Structures`03.

Maciñeira, Burcharth (2007): New formula for stability of cube armoured roundheads, Coastal Structures`07.