

ACOUSTICS2008/627
Elastic scattering by partially-solid-filled spherical shell on the seabed: Model-data comparison and physical understanding

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Low- to mid-frequency elastic scattering measurements were conducted in the range from 5 to 40 ka on a spherical composite shell deployed proud on a sandy seabed. The object consists of a thin-walled shell made of layers of a random-fiber material, and then filled partially with an isotropic solidified epoxy resin and partially with sea water. A scaled version of the object was measured in a water tank under free field conditions. The target responses obtained with and without interaction with the seafloor boundary were compared to simulations achieved by the NURC modeling tool Axiscat. The temporal echoes of the objects were analyzed in terms of elastic waves supported by the structure, on the basis of a ray model. The strongest elastic components come from the interior solid filler. The experimental data of the sphere on the seabed were acquired in October 2006 during the EVA'06 trial off the Island of Elba. The free field data were collected in the NURC water tank.