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Three-dimensional oblique water-entry problems at small dead-rise angles MATTHEW MOORE, SAM HOWISON, JOHN OCKENDON, JAMES OLIVER, University of Oxford — We extend two-dimensional Wagner theory for the ideal, incompressible normal impact of rigid bodies that are nearly parallel to the surface of a liquid half-space. In particular, the impactors we consider are three-dimensional and have an oblique impact velocity that is an order of magnitude larger than the normal impact velocity of the body. A reformulation of the leading-order problem in terms of the displacement potential reveals the relationship between the oblique and corresponding normal impact solutions. We exploit this relationship to find new solutions to three-dimensional oblique impact problems. In the particular example of axisymmetric impactors, we consider several oblique-impact geometries in which singularities can develop on the boundary of the wetted region. We present the corresponding pressure profiles and models for the splash sheets and discuss the consequences of this breakdown of the theory.

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