

1 Problem 1

Imagine humanity has developed a photon rocket capable of achieving any speed and acceleration, but its initial mass is limited to that of modern spacecraft. If an astronaut boarded this spacecraft, how far could they travel in their lifetime? If a radio message were sent back from their destination, when would it be received on Earth?

2 Problem 2

Ultra-deep water submersibles such as Triton 36000 that have successfully dived to the deepest trenches of Ocean, into the depth of around 11 km.

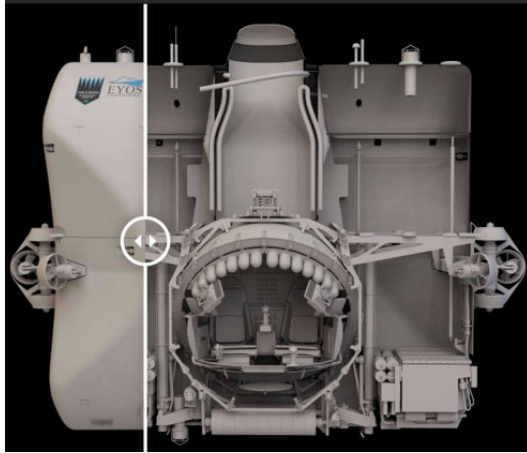


Figure: Triton 36000 with its spherical pressure hull.

What is the minimal thickness of the pressure hull of such a submersible and how does it depend on the characteristics of the material used? What material is to be used?