Floating Object and Simple Harmonic Motion (14.66)



Object floating means buoyant force = weight Mg = $(\rho Ad)g$ d = M/ ρA



Object floating with extra force F means more buoyant force Mg + F = $(\rho Ad)g + (\rho Ay)g$ y = F/ ρAg

When F is removed then there will be an extra upward buoyant force = $(\rho Ay)g$ $F_{extra} = -\rho Agy$ (negative because y is positive in downward direction) $F_{extra} = Md^2y/dt^2 = -\rho Agy \implies d^2y/dt^2 = -(\rho Ag/M)y \implies \omega^2 = \rho Ag/M$