

Abstract Submitted
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Diving seabirds: the stability of a diving elastic beam BRIAN CHANG, MATTHEW CROSON, SUNGHWAN JUNG, Virginia Tech — In this study, we examine the buckling stability of a beam attached to a cone plunge diving into a bath of water, which is inspired by diving birds. This beam-cone system initially experiences an impact force before the cone is completely submerged, followed by a hydrodynamic drag force. Using high speed imaging techniques, it was observed that the soft elastic beam exhibits either buckling (unstable) or non-buckling (stable) behaviors upon impact and submergence. Large cone angles, long beams, and high impact velocities likely cause buckling in the beam. By varying geometric factors of the beam-cone system and changing the impact velocity, a transition from non-buckling to buckling is characterized through physical experiments and is verified by an analytical model. This study elucidates under which conditions diving birds may possibly get injured.

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