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Spall Fracture of Metallic Circular Plates, Vessel Endplates and Conical Frustums Driven by Direct Explosive Loads TETSUYUKI HIROE, KAZUHITO FUJIWARA, Kumamoto University, HIDEHIRO HATA, Kumamoto Universuty, DAIKI TSUTSUMI, Kumamoto University — Dynamic fracture experiments are conducted for circular plates, vessel endplates and conical frustums of A2017-7075 aluminum alloys and 304 stainless steel, using a testing apparatus developed applying wire-row explosion technique to initiation, where tensile stress waves are generated producing spall in the specimens by the direct incidence of plane detonation waves of the explosive PETN. A VISAR system is adopted to observe the free-surface velocity histories of the specimens. The signals for basic circular plate specimens indicate the characteristics of the failure for tested materials, effects of explosive thickness variations and the configuration of specimens. Hydro codes are satisfactorily applied to simulate the experimental signal data and observed damage phenomena of recovered specimens. Next, an explosive-filled cylindrical vessel with endplate at the one end is initiated at the other end surface and expanded by axially propagating explosive detonation to fracture. Both the VISAR signals and numerical simulation indicate a pullback signal of spallation at the endplate. Finally conic frustums are also loaded by plane detonation, showing different type of spall failure due to the additional reflected waves from the slopping side surfaces.

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