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A VERSATILE SMALL-SCALE APPARATUS FOR INTERNAL AIRBLAST STUDIES

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The Air Force Research Laboratory, Munitions Directorate (AFRL/RW) has found small-scale experimentation to be particularly valuable for investigating airblast phenomenology associated with internal detonations [Ref. 1, 2]. Conduct of internal detonation experiments in "table-top" models of buildings instead of full-scale buildings has a) dramatically reduced experiment costs, b) enabled additional instrumentation and diagnostics, and c) permitted the affordable conduct of replicate experiments. Thus far, AFRL/RW's approach has been to fabricate rigid scale models of buildings for specific experiment purposes (e.g., comparison to full-scale results, study mass flow of detonation products through openings, etc.). A consequence of this has been a limited capability of varying parameters for follow-on studies, especially for parameters associated with the rigid target geometry.

AFRL/RW has designed and partially fabricated a new small-scale building model with greater versatility and re-configurability. While representative of no specific building, the scale model exhibits the geometry of a Y-shaped building floor plan at a nominal $1/9^{th}$ scale (with regard to typical building dimensions). The "wings" of the Y-shaped scale model employ orthogonal room layouts, while the "atrium" offers a more modern non-orthogonal target geometry. Window and door openings are plentiful throughout the scale model, and can be opened or closed to simulate different venting conditions. Rectangular, T-shaped, and L-shaped room geometries, and also hallways, are present in the scale model design. Various explosive detonation positions are available, and of course explosive loading density can be varied within prescribed limits. Two of the wings are detachable, enabling them to be replaced with different scale model designs of future interest. Pressure gage mount locations are dispersed throughout the model, as well as various appurtenances for high speed imaging.

At present, two of the Y-shaped model's "wings" and "atrium" have been fabricated, with the third "wing" planned for the future, as shown in Figure 1. In this paper, we describe this new test apparatus and its inaugural experiment series. A sampling of representative measurements from the small-scale experiments are provided, along with discussion of applications.

Figure 1. Photograph of the Y-shaped building model.

REFERENCES

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