IMPACT OF CONCRETE MASONRY BLOCK ON THE RESILIENCE OF THE BUILT ENVIRONMENT

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New MIT CSHub research demonstrates that the home's primary structural system plays a critical role in hurricane wind resilience. Researchers found that modern reinforced masonry homes consistently sustained less wind damage than comparable wood-frame homes across major building components during hurricanes across three case studies.

WHY STRUCTURE MATTERS

Traditional hurricane mitigation efforts focus on the building envelope such as roofs, windows, and doors.

MIT researchers found the primary structural system also plays a critical role by influencing how wind damage develops and propagates throughout the building.

Evaluating both the structural system and building envelope provides a more complete picture of hurricane performance, and investing in stronger structural systems can enhance resilience beyond code requirements.

Previous research found homes built under the 2001 Florida Building Code experienced up to 72% lower windstorm losses than homes built before the statewide code adoption.[1]



WIND DAMAGE ACROSS MAJOR BUILDING COMPONENTS

Damage ratios are based on standardized post-storm damage assessments, with lower values indicating less damage. Research from *Beyond the Envelope: How a Home's Structural System Shapes Hurricane Damage* found that masonry-block and reinforced-concrete homes consistently sustained less wind-induced damage than comparable wood-frame homes across three hurricane case studies.

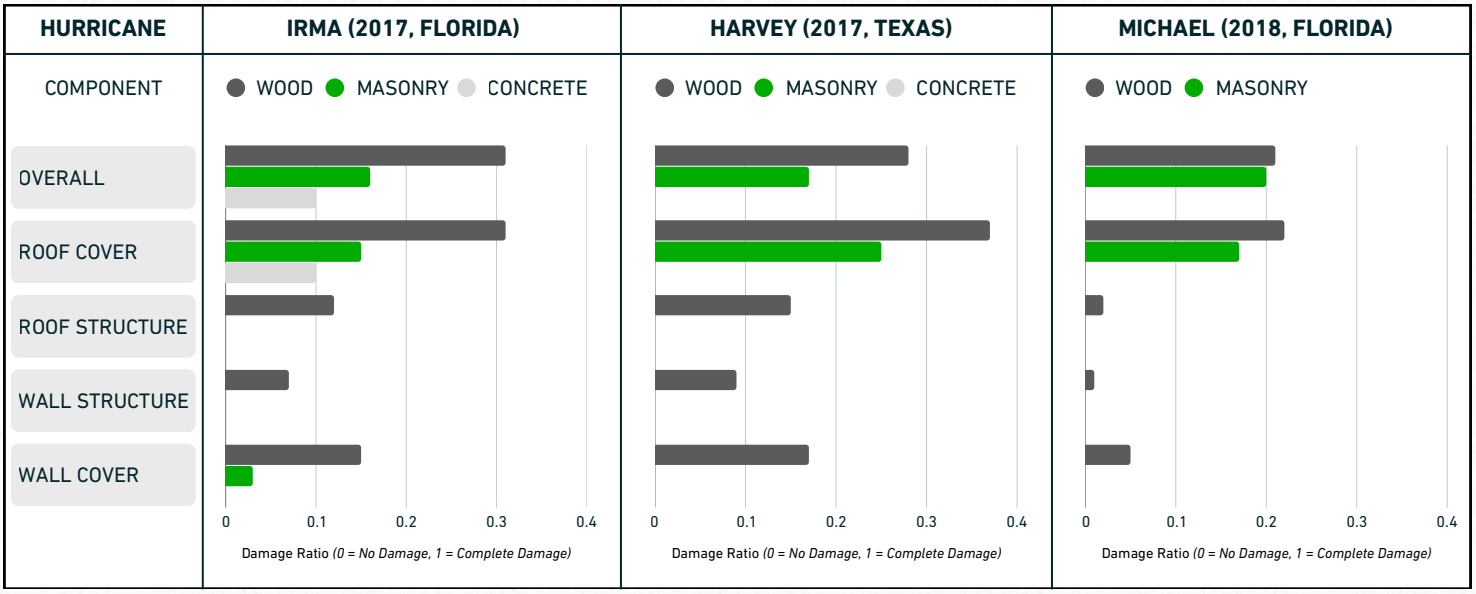


Figure 1. Comparison of wood-frame, masonry-block, and reinforced-concrete home component damage during Hurricanes Irma, Harvey, and Michael. The damage axis displays the portion of the normalized damage scale (0–0.4) where all observed damage occurred.

QUANTIFYING THE RESILIENCE VALUE OF MODERN MASONRY

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THE MODELING GAP

FEMA's HAZUS model is widely used to estimate hurricane damage and losses.

The default masonry single-family (MSF) model is based largely on data from Hurricane Andrew (1992), before adoption of today's Florida Building Code.

In a South Florida case study, MIT researchers found that modern masonry homes built to code performed substantially better than the default HAZUS classification would suggest during Hurricane Irma.

OBSERVED WIND DAMAGE VS. HAZUS PREDICTIONS

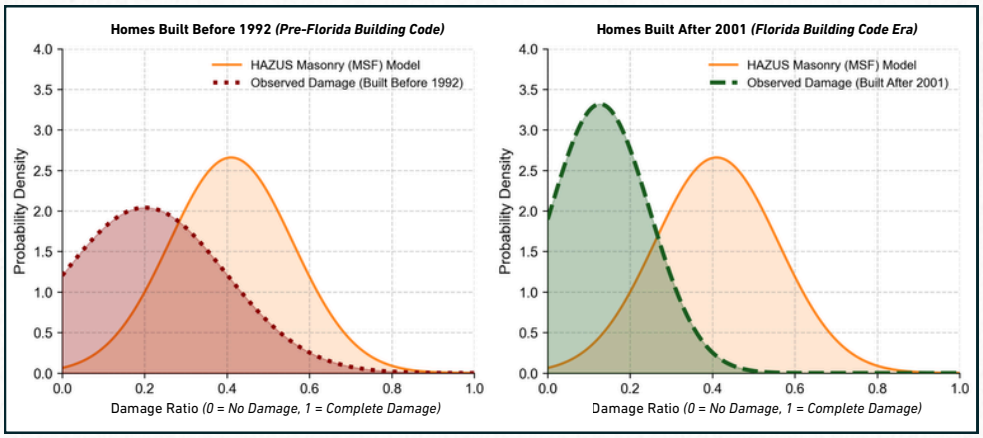


Figure 2. Comparison of observed wind damage with FEMA HAZUS masonry models for homes built before 1992 and after 2001. Lower damage ratios indicate less expected damage.

KEY RESEARCH FINDINGS

STRUCTURAL SYSTEMS AND ENVELOPES MATTER

The home's primary structural system is a critical driver of hurricane wind resilience and influences how damage propagates throughout the building.

LOWER OBSERVED WIND DAMAGE

Concrete and masonry homes sustained less wind-induced damage than comparable wood-frame homes across major building components.

MODERN MASONRY PERFORMANCE

Modern masonry homes built under the Florida Building Code performed substantially better during Irma than FEMA's default HAZUS masonry model predicts.

RESILIENCE MODELING GAP

Current models may undervalue modern masonry resilience, influencing insurance recognition, mitigation decisions, and public investment priorities.

IMPLICATIONS FOR DECISION MAKERS

HOMEOWNERS

Greater awareness of modern masonry's resilience helps homeowners better understand its long-term value and supports fairer insurance recognition.

INSURERS

Improved differentiation between construction systems can improve pricing accuracy and underwriting decisions.

POLICYMAKERS

More reliable resilience data supports better informed building code, community mitigation, and public investment decisions.

COMMUNITIES

Increased confidence in resilient construction helps communities make more informed building and investment decisions.

RESEARCH RESOURCES

This publication summarizes findings from two 2026 MIT Concrete Sustainability Hub research briefs:

- *Beyond the Envelope: How a Home's Structural System Shapes Hurricane Damage*
- *Modern Masonry Performance in Hurricane Irma: A Comparison with HAZUS Vulnerability Models*

SUPPORTING REFERENCE

[1] Simmons, K. M., J. Czajkowski, and J. M. Done. *"Economic Effectiveness of Implementing a Statewide Building Code: The Case of Florida."* Land Economics 94, no. 2 (2018): 155–74.

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Scan to learn how concrete masonry supports resilient communities, durable homes, and long-term value.

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