Monte Carlo Simulation Model for Commercial Residential Buildings (MCS-CRB) Use Case II Glossary

Glossary

MCS-LB

ENCLOSURECONDITIONUPDATER_GABLE.m

Input Variables	Description	Terms in Documentation
direction i	a scalar describing the wind's direction of approach, it can be any integer between 1 and 8. A cornering wind is denoted by 2, 4, 6 or 8, wind hitting the short side of the building is denoted by 3 or 7, while wind hitting the building's long side is denoted by 1 or 5.	Enclosure Condition: the condition that describes the area of openings within a given building. For this model the enclosure condition is computed for every story and for the attic. The enclosure condition affects the internal pressure of the building and as a result the load
RoofType	a string array describing the geometry of the roof, it can be 'Gable' or 'Hip'	intensities can change.
RoofSlope	a string array describing the geometry of the	

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roof, it can be 'Gable' or 'Hip'. EaveHeigh a scalar t describing the height of the roof at the eave in feet. LengthFL a scalar describing the R building's reassigned floor plan length in feet. WidthFLR a scalar describing the building's reassigned floor plan width in feet. TotalNumb a scalar erofStories describing the total number of stories present in a building. Enclosure a string array ConditionA containing an ttic initial condition for the enclosure condition of the attic; it can be 'E', 'P', or 'O'. Enclosure a matrix (rows = ConditionA TotalNumberofSt **IIFloors** ories, cols = 1), containing the enclosure

condition ('E', 'P', or 'O') for every story. Componen matrices **Enclosure** t Area containing the Condition: the area occupied by Maps condition that a component in a describes the location of a wall area of openings mapped by the within a given matrix indexes building. For this (matrix size = # model the of stories by # of enclosure wall sheathing condition is panels on that computed for wall). every story and for the attic. The Componen matrices enclosure t Damage identifying the condition affects Mappers damage of the internal particular pressure of the components for building and as a a given wall result the load (matrix size = # intensities can of stories by # of change. wall sheathing panels on that wall). A 1 denotes a damaged component while a 0 denotes an undamaged one. External scalars Pressure determined in Coefficient accordance with Possibilitie ASCE 7-05, they are function of S the wind effective area of the building and the approach

direction of the wind. Failure_Id Matrix = ent_Sheat Identifies the hing sheathing panels that have failed with a value of 1. Failure_Lo Matrix = Thead_Sheath averaged pressure load on ing each sheathing panel, taking Area_of_S a matrix heathing comprising the area of each sheathing panel on the roof External a matrix Pressure containing the Coefficient weighted external S pressure coefficients for every sheathing panel in a given floor (matrix size = 1 by # of wall sheathing panels on that wall). **Output Variables** GCpi A vector whose length is equal to the number of floors of the building. The

internal pressure is determined by the opening

created by wall
sheathing and
window
damages.

GCpi_Attic A scalar
indicating the
internal pressure
of the attic
space.

ENCLOSURECONDITIONUPDATER_HIP.m

Input Variables	Description	Terms in Documentation
direction i	a scalar describing the	Enclosure Condition: the
	wind's direction of approach, it can be any	condition that describes the area of openings
	integer between 1 and 8. A	within a given building. For this
	cornering wind is denoted by 2, 4, 6 or 8, wind	model the enclosure condition is
	hitting the short side of the building is	computed for every story and for the attic. The
	denoted by 3 or 7, while wind hitting the building's long	enclosure condition affects the internal pressure of the
	side is denoted by 1 or 5.	building and as a result the load
Failure_Id ent_Sheat hing_Hip_ #	Matrix = Identifies the sheathing panels that have failed with a value of 1. (# = 1	intensities can change.

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or 2 is used in
             the identification
             of the particular
               Hip Region)
Failure_Id
                 Matrix =
ent_Sheat
               Identifies the
hing_Main
                sheathing
    #
             panels that have
               failed with a
             value of 1. (# = 1
              or 2 is used in
             the identification
             of the particular
                Main Roof
                 Region)
Failure_Lo
               Matrix = The
ad_Sheat
                 averaged
hing_Hip_
             pressure load on
             each sheathing
               panel, taking
                   into
              consideration
             the contribution
             of each zone for
             each panel and
                   their
              corresponding
             pressure loading
               (# = 1 \text{ or } 2 \text{ is})
               used in the
              identification of
               the particular
               Hip Region)
Failure_Lo
               Matrix = The
ad_Sheat
                 averaged
hing_Main
             pressure load on
    _#
             each sheathing
               panel, taking
                   into
              consideration
```

the contribution
of each zone for
each panel and
their
corresponding
pressure loading
(# = 1 or 2 is
used in the
identification of
the particular
Main Roof
Region)

Areas

Matrix = Matrix identifying the total area of each sheathing panel on the Main Roof Regions. Units are ft^2

Areas_Hip

Matrix = Matrix identifying the total area of each sheathing panel on the Hip Regions. Units are ft^2

RoofType

a string array describing the geometry of the roof, it can be 'Gable' or 'Hip'.

RoofSlope

a scalar

describing the
roof slope

condition: the
condition that
describes the
area of openings
within a given
building. For this

EaveHeig ht	a scalar describing the height of the roof at the eave in feet.	model the enclosure condition is computed for every story and for the attic. The
LengthFL R	a scalar describing the building's re- assigned floor plan length in feet.	enclosure condition affects the internal pressure of the building and as a result the load
WidthFLR	a scalar describing the building's re- assigned floor plan width in feet.	intensities can change.
TotalNum berofStori es	a scalar describing the total number of stories present in a building.	
Enclosure Condition Attic	a string array containing an initial condition for the enclosure condition of the attic; it can be 'E', 'P', or 'O'.	
Enclosure Condition AllFloors	a matrix (rows = TotalNumberofS tories, cols = 1), containing the enclosure condition ('E', 'P', or 'O') for every story.	

Compone nt Area Maps	matrices containing the area occupied by a component in a location of a wall mapped by the matrix indexes (matrix size = # of stories by # of wall sheathing panels on that wall).	
Compone nt Damage Mappers	matrices identifying the damage of particular components for a given wall (matrix size = # of stories by # of wall sheathing panels on that wall). A 1 denotes a damaged component while a 0 denotes an undamaged one.	
External Pressure Coefficient Possibilitie s	scalars determined in accordance with ASCE 7-05, they are function of the wind effective area of the building and the approach direction of the	Enclosure Condition: the condition that describes the area of openings within a given building. For this model the enclosure condition is

Failure_Id ent_Sheat hing	wind. Matrix = Identifies the sheathing panels that have failed with a value of 1.	computed for every story and for the attic. The enclosure condition affects the internal pressure of the building and as
Failure_Lo ad_Sheat hing	Matrix = The averaged pressure load on each sheathing panel, taking into consideration the contribution of each zone for each panel and their corresponding pressure loading.	a result the load intensities can change.
Area_of_S heathing	= a matrix comprising the area of each sheathing panel on the roof	
External Pressure Coefficient s	a matrix containing the weighted external pressure coefficients for every sheathing panel in a given floor (matrix size = 1 by # of wall sheathing panels on that wall).	

Output Variables

GCpi A vector whose length is equal to the number of floors of the building. The internal pressure is determined by the opening created by wall sheathing and window damages. GCpi_Atti A scalar indicating the С internal pressure of the attic space.

*Model_Control.m

R2W_Capacity_Gable.m

Input Variables	Description	Terms in Documentation
rating Number_of _Trusses_ Row	scalar = Indicates the strength rating of the components: 1 (weak), 2 (medium), and 3 (strong) scalar = Indicates the number of r2w connections along the eave of the roof.	Roof sheathing: The 4x8 ft plywood panels that are attached to the roof trusses and provide a mounting system for the roof cover.

Outp	ut Variables
r2w_cap	Matrix contains the randomly assigned capacity of each of the r2w connection. The size of the matrix depends on the number of trusses and is equal to 2 by Number_of_Tr usses_Row (one row for each roof face). Units are lbs.
mean_resis t	A scalar value representing the mean resistance of the r2w connection after the FS is applied.

R2W_Capacity_Hip.m

Input Variables	Description	Terms in Documentation
rating	scalar = Indicates the strength rating of the	
	components: 1	
	(weak), 2	
	(medium), and 3	
	(strong). Variable	
	is used to select	
	the mean capacity	
	of the roof	
	components.	