

Appliance

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appliance - General residential appliance model *New in 3.0!*

Synopsis

```
module residential;  
object appliance {  
    // inherited from residential_enduse  
    durations "duration-array";  
    transitions "transition-array|transition-matrix";  
    impedances "impedance-array";  
    currents "current-array";  
    powers "power-array";  
    heatgains "heatgain-array";  
}
```

Remarks

The **appliance** model implement a general purpose state-based residential appliance model. The model implements a N state model where N is the length of the durations array. As the appliance changes states, the corresponding values from the impedances, currents, powers, and heatgains are copied to the residential_enduse properties.

The transitions matrix specified the probability of a state change during the time interval of the state specified in the durations array. If the transitions matrix is a 1xN matrix, the state transitions are linear from state 0 to state N-1 and back to state 0 during the time interval. If the transitions matrix is a NxN matrix, the state transitions are from any given state to any other state with the corresponding probability during the time interval. A transition value of 0 is used to indicate that no transition will occur in the interval.

durations

A 1xN array of doubles specifying the time duration of each state. The size of the durations array determines the number of states.

transitions

A 1xN or NxN matrix of doubles specifying the transition probability to the next state (for 1xN) or any state (for NxN) during the time interval. The value of N is determined by the size of the durations array.

impedances

A 1xN array of complex values specifying the impedance of the appliance when in each state. The value of N is determined by the size of the durations array.

current

A 1xN array of complex values specifying the currents of the appliance when in each state. The value of N is determined by the size of the durations array.

powers

A 1xN array of complex values specifying the powers of the appliance when in each state. The value of N is determined by the size of the durations array.

heatgains

A 1xN array of doubles specifying the heat gains fraction to the interior air of the appliance when in each state. The value of N is determined by the size of the durations array.

Example

The following example illustrates a simple linear-state appliance model:

```

module residential;
object appliance {
  //      daily,  pump,  agitate,  pump,  spin
  durations  "86400  60    300      60    300";
  transitions "0.25  0.0   0.0      0.0   0.0";
  powers     "0      1+0.1j 1+0.2j   1+0.1j 2+0.2j";
};

```

The state machine starts roughly once daily with a 1/4 probability. The first state lasts 1 minute with a 1kW+0.1kVAR load. The second state lasts 5 minutes with a 1kW+0.2kVAR load. The third state lasts 1 minute with a 1kW+0.1kVAR load. The last state last 5 minutes with 2kW+0.2kVAR load.

Version

The general **appliance** model was introduced in Hassayampa (Version 3.0).

See also

- Residential module
 - User's Guide
 - Appliances
 - house class – Single-family home model.

- residential_enduse class – Abstract residential end-use class.
- occupantload – Residential occupants (sensible and latent heat).
- ZIPload – Generic constant impedance/current/power end-use load.
- Technical Documents
 - Requirements
 - Specifications
 - Developer notes
 - Technical support document
 - Validation

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