

implemented method for thermo-fluid management of a conditioned space is provided. The method includes obtaining, via one or more hardware processors, a data input file comprising conditioned space data associated with the conditioned space wherein the conditioned space includes a geometrical data of the conditioned space and operational data of the plurality of components in a text format. Further, the method includes automatically generating a 3D geometry of the conditioned space in a format suitable for a mesh generation model for numerical analysis, via the one or more hardware processors, wherein automatically generating the 3D geometry for numerical analysis comprises parsing the conditioned space data to obtain the geometrical data associated with the plurality of components of the conditioned space, wherein the geometrical data represents the plurality of components by a plurality of points, a plurality of lines and a plurality of surfaces with corresponding naming conventions wherein parsing of the conditioned space data comprises obtaining plurality of corner points from a plurality of line pairs selected from the plurality of lines, and creating, based on the parsed geometrical data, the 3D geometry of the conditioned space having the plurality of components in the format suitable for a mesh generation tool for numerical analysis. Also, the method includes creating a mesh within the 3D geometry using the mesh generation tool, via the one or more hardware processors. Moreover, the method includes generating simulation data based at least on an operational data of the plurality of components, via the one or more hardware processors, the operational data representative of operational specifications of the plurality of components. Additionally, the method includes applying the simulation data on the mesh to simulate a thermo-fluid model of the conditioned space, via the one or more hardware processors. Creating the 3D geometry can include arranging each corner point of the plurality of corner points in an order of appearance in the conditioned space based on an identification of a nearest corner point in a direction corresponding to the each corner point.

[006] In another embodiment, a system for thermo-fluid management of a conditioned space is provided. The system includes one or more memories storing instructions; and one or more hardware processors coupled to the one or more memories. The one or more hardware processors are configured by said instructions to obtain a data input file comprising conditioned space data associated with the conditioned space wherein the conditioned space includes a geometrical data of the conditioned space and operational data of the plurality of components in a text format. The one or more hardware processors are configured by said

instructions to automatically generate a 3D geometry of the conditioned space in a format suitable for a mesh generation model for numerical analysis. To automatically generating the 3D geometry for numerical analysis, the one or more hardware processors are configured by said instructions to parse the conditioned space data to obtain the geometrical data associated with the plurality of components of the conditioned space, wherein the geometrical data represents the plurality of components including their corresponding locations in the conditioned space, coordinates of corner point, length, width, height by a plurality of points, a plurality of lines and a plurality of surfaces with corresponding naming conventions wherein parsing of the conditioned space data comprises obtaining plurality of corner points from a plurality of line pairs selected from the plurality of lines, create, based on the parsed geometrical data, the 3D geometry of the conditioned space having the plurality of components in the format suitable for a mesh analysis; create a mesh within the 3D geometry using the mesh generation model; generate simulation data based at least on an operational data of the plurality of components, the operational data representative of operational specifications of the plurality of components; and apply the simulation data on the mesh to simulate a thermo-fluid model of the conditioned space, wherein creating the 3D geometry can include arranging each corner point of the plurality of corner points in an order of appearance in the conditioned space based on an identification of a nearest corner point in a direction corresponding to the each corner point. Further, the one or more hardware/software processors are configured by said instructions to

CLAIMS

We claim

1. A processor-implemented method for thermo-fluid management of a conditioned space having a plurality of components, the method comprising:

obtaining, via one or more hardware processors, a data input file comprising conditioned space data associated with the conditioned space wherein the conditioned space includes a geometrical data of the conditioned space and operational data of the plurality of components in a text format;

automatically generating a 3D geometry of the conditioned space in a format suitable for a mesh generation model for numerical analysis, via the one or more hardware processors, wherein automatically generating the 3D geometry for numerical analysis comprises:

parsing the conditioned space data to obtain the geometrical data associated with the plurality of components of the conditioned space, wherein the geometrical data represents the plurality of components including their corresponding locations in the conditioned space, coordinates of corner point, length, width, height by a plurality of points, a plurality of lines and a plurality of surfaces with corresponding naming conventions wherein parsing of the conditioned space data comprises obtaining plurality of corner points from a plurality of line pairs selected from the plurality of lines,

creating, based on the parsed geometrical data, the 3D geometry of the conditioned space having the plurality of components in the format suitable for a mesh analysis;

creating a mesh within the 3D geometry using the mesh generation model, via the one or more hardware processors;

generating simulation data based at least on an operational data of the plurality of components, via the one or more hardware processors, the operational data representative of operational specifications of the plurality of components; and

applying the simulation data on the mesh to simulate a thermo-fluid model of the conditioned space, via the one or more hardware processors,

wherein creating the 3D geometry comprises arranging each corner point of the plurality of corner points in an order of appearance in the conditioned space based on an identification of a nearest corner point in a direction corresponding to the each corner point.

2. The method as claimed in claim 1, further comprising assembling a component name-attribute list from the conditioned space data, the component name-attribute list comprising names of the plurality of components and a plurality of keywords associated with attributes of the plurality of components.

3. The method as claimed in claim 2, wherein parsing the conditioned space data comprises:

- iteratively checking for presence of each of the plurality of components of the component name-attribute list in the data input file;

- extracting geometrical data of a set of components from among the plurality of components that are determined to be present in the data input file;

- for each of the set of components, preparing point coordinates and assigning names for the set of components; and

- storing the set of components with assigned names and respective point coordinates to obtain the parsed conditioned space data.

4. The method as claimed in claim 1, wherein obtaining the plurality of corner points comprises:

- performing iteratively, for a plurality of line pairs selected from the plurality of lines::

- selecting a line pair from the data input file and determining distance measure between corresponding end-points of the line pair; and

- determining whether lines of the line pair have one common point based on the distance measure between end-points for the line pair, wherein one non-zero distance measure and one zero distance measure between the end-points of the line pair is indicative of a corner point between the line pair.

5. The method as claimed in claim 1, wherein creating the 3D geometry of the conditioned space further comprises:

- performing iteratively for each component of the set of components selected from the component name-attribute list:

- determining one or more sets of lines from the plurality of lines based on a set of corner points associated with the component, and assigning names to the set of lines based on the names of the set of corner points used to create the set of lines;

creating a plurality of surfaces by one or more set of lines from the plurality of lines appearing in single plane, and assigning names to the plurality of surfaces based on the names of the one or more sets of lines used to create the plurality of surfaces; and

combining the plurality of surfaces to create the 3D geometry, and assigning a name to the 3D geometry.

6. The method as claimed in claim 1, wherein generating the simulation data comprises:

parsing the conditioned space data to obtain operational data associated with the plurality of components; and

converting the operational data into the format suitable for computational fluid dynamics (CFD) analysis.

7. A system for thermo-fluid management of a conditioned space having a plurality of components, the system comprising:

one or more memories storing instructions; and

one or more hardware processors coupled to the one or more memories, wherein said one or more hardware processors are configured by said instructions to:

obtain a data input file comprising conditioned space data associated with the conditioned space wherein the conditioned space includes a geometrical data of the conditioned space and operational data of the plurality of components in a text format;

automatically generate a 3D geometry of the conditioned space in a format suitable for a mesh generation model for numerical analysis, wherein to automatically generating the 3D geometry, the one or more hardware processors are configured by said instructions to:

parse the conditioned space data to obtain the geometrical data associated with the plurality of components of the conditioned space, wherein the geometrical data represents the plurality of components including their corresponding locations in the conditioned space, coordinates of corner point, length, width, height by a plurality of points, a plurality of lines and a plurality of surfaces with corresponding naming conventions wherein parsing of the conditioned space data comprises obtaining plurality of corner points from a plurality of line pairs selected from the plurality of lines,

create, based on the parsed geometrical data, the 3D geometry of the conditioned space having the plurality of components in the format suitable for a mesh analysis;

create a mesh within the 3D geometry using the mesh generation model;
generate simulation data based at least on an operational data of the plurality of components, the operational data representative of operational specifications of the plurality of components; and

apply the simulation data on the mesh to simulate a thermo-fluid model of the conditioned space,

wherein creating the 3D geometry comprises arranging each corner point of the plurality of corner points in an order of appearance in the conditioned space based on an identification of a nearest corner point in a direction corresponding to the each corner point.

8. The system as claimed in claim 7, wherein the one or more hardware processors are further configured by the instructions to assemble a component name-attribute list from the conditioned space data, the component name-attribute list comprising names of the plurality of components and a plurality of keywords associated with attributes of the plurality of components.

9. The system as claimed in claim 8, wherein to parse the conditioned space data, the one or more hardware processors are further configured by the instructions to:

iteratively check for presence of each of the plurality of components of the component name-attribute list in the data input file;

extract geometrical data of a set of components from among the plurality of components that are determined to be present in the data input file;

for each of the set of components, prepare point coordinates and assigning names for the set of components; and

store the set of components with assigned names and respective point coordinates to obtain the parsed conditioned space data.

10. The system as claimed in claim 7, wherein to obtain the plurality of corner points, the one or more hardware processors are further configured by the instructions to:

perform iteratively, for a plurality line pairs selected from the plurality of lines:

select a line pair from the data input file and determining distance measure between corresponding end-points of the line pair; and

determine whether lines of the line pair have one common point based on the distance measure between end-points for the line pair, wherein one non-zero distance measure and one zero distance measure between the end-points of the line pair is indicative of a corner point between the line pair.

11. The system as claimed in claim 7, wherein to create the 3D geometry of the conditioned space, the one or more hardware processors are further configured by the instructions to:

perform iteratively for each component of the set of components selected from the component name-attribute list:

determine one or more sets of lines from the plurality of lines based on a set of corner points associated with the component, and assign names to the set of lines based on the names of the set of corner points used to create the set of lines;

create a plurality of surfaces by one or more set of lines from the plurality of lines appearing in single plane, and assign names to the plurality of surfaces based on the names of the one or more sets of lines used to create the plurality of surfaces; and

combine the plurality of surfaces to create the 3D geometry, and assign a name to the 3D geometry.

12. The system as claimed in claim 7, wherein to generate the simulation data, the one or more hardware processors are further configured by the instructions to:

parse the conditioned space data to obtain operational data associated with the plurality of components; and

convert the operational data into the format suitable for computational fluid dynamics (CFD) analysis.