OFreq

Derived Outputs Calculation

Nicholas Barczak

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Revision History

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1.00	Dec 30, 1999	Initial Issue	

Prepared By

Datawave Marine Science
3500 27th Pl West
Apt 423
Seattle, WA 98199

www.dmsonline.us

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1 Introduction

This document lists the required calculations for each object and method associated with the derived outputs.

2 Class: OutputsList

The class OutputsList is the central object that all outputs are controlled from. It's main function is to contain the list of outputsBody objects. It also contains the list of wave frequencies and wave directions, as these are not associated with any one body.

2.1 Attribute: Frequencies

The list of wave frequencies used for the analysis.

2.2 Attribute: WaveDirections

The list of wave directions used for the analysis.

2.3 Attribute: OutputsBody

This is a vector of outputsBody objects. Each outputsBody objects is associated with a single body.

2.4 Operation: CalculateOutputs()

The class iterates through each outputsBody object in its attribute. For each outputsBody object, it implements the CalculateOutputs operation of that object.

3 Class: OutputsBody

The class outputsBody contains all the outputs calculated for a single body. The list is quite extensive. There are numerous types of outputs, with each output represented as its own class.

3.1 Attribute: Body

The body associated with this set of calculations.

3.2 Attribute: WaveDirCurrent

The integer specifying the index of the current wave direction.

3.3 Attribute: OutputsList

The list of all outputs calculated. This will be a long list of objects. There will be multiple object types contained in the list, each with different memory requirements.

3.4 Operation: CalculateOutputs

Command to iterate through all the different output types and trigger the calculation for each output type.

4 Class: OutputDerived

4.1 Attribute: Body

A pointer to the body object used for calculating the outputs.

4.2 Attribute: Output

A vector of the resultant from the output calculation. Each entry within the vector may also be a vector of some unknown memory size.

4.3 Attribute: Name

A simple descriptive name for the output. Encoded as part of the attributes for each output.

4.4 Operation: CalcOutput()

This is the operation to actually calculate the derived output. Its definition changes with each output class.

5 Class: GlobalSolution

Many of the properties are inherited from the parent classes.

5.1 Inherited Attributes

Attribute: Body → Class outputDerived

Attribute: Output → Class outputDerived

Attribute: Name → Class outputDerived

5.2 Inherited Operations
Operation: calcOutput() → Class outputDerived

5.3 Attribute: OrderDerivative
Integer value specified for the order of the derivative.

5.4 Concrete Operation: CalcOutput
CalcOutput() takes the vector of global motions from the associated Body Object. For the 6 degree of freedom case, this would produce a 6x1 array of complex variables. The operation then multiplies each entry times the following formula.

$$CalcOutput[0..*] = (\omega)^n (i)^n \bar{X}[0..*] \qquad \text{Equation 5.1}$$

Where:
CalcOutput[0..*] = Entry in array of results
ω = Current wave frequency
i = Complex number, defined (0,1)
X = Array of body solution results.
n = Integer value of orderDerivative

6 Class: GlobalMotion
Many of the properties are inherited from the parent classes.

6.1 Inherited Attributes
Attribute: Body → Class outputDerived

Attribute: Output → Class outputDerived

Attribute: Name → Class outputDerived

Attribute: orderDerivative → Class globalSolution

6.2 Inherited Operations
Operation: calcOutput() → Class globalSolution

6.3 Operation: Constructor
Upon creation of the class, the constructor automatically sets the orderDerivative attribute to an integer value of 0.

7 Class GlobalVelocity
Many of the properties are inherited from the parent classes.

7.1 Inherited Attributes

Attribute: Body → Class outputDerived

Attribute: Output → Class outputDerived

Attribute: Name → Class outputDerived

Attribute: orderDerivative → Class globalSolution

7.2 Inherited Operations

Operation: calcOutput() → Class globalSolution

7.3 Operation: Constructor

Upon creation of the class, the constructor automatically sets the orderDerivative attribute to an integer value of 1.

8 Class GlobalAcceleration

Many of the properties are inherited from the parent classes.

8.1 Inherited Attributes

Attribute: Body → Class outputDerived

Attribute: Output → Class outputDerived

Attribute: Name → Class outputDerived

Attribute: orderDerivative → Class globalSolution

8.2 Inherited Operations

Operation: calcOutput() → Class globalSolution

8.3 Operation: Constructor

Upon creation of the class, the constructor automatically sets the orderDerivative attribute to an integer value of 2.

9 Conclusion

This completes the definition for the derived outputs class. The UML class diagram shows many other objects in the class. These are outside the current scope.

10 References