

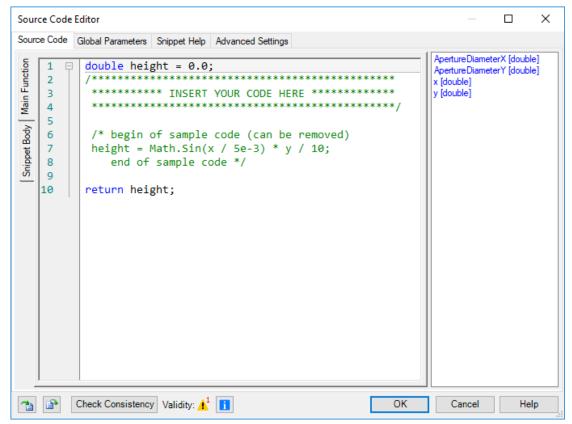
#### **Source Code Editor**

#### Abstract

For the optical elements, which cannot be found in the catalogs of VirtualLab Fusion, users can create them by using programmable objects, e.g., programmable source, interface, medium, and detector. Also a programmable component is available, which allows users to develop own algorithm, with the access of all optical elements, as well as the implemented functions of VirtualLab. The programming language is C#. The source code editor is the most important structure of all programmable objects. This use case introduces the general structure of the source code editor.

#### This Use Case Shows...

the general structure of the Source Code Editor of programmable objects.



## **Tabs: Source Code**

- Source Code tab :
  - left panel: source code in C# syntax
    - Main Function: snippet function to calculate the values this programmable object need to return. For example, in case of programmable interface, the snippet function calculate and return the height profile of this interface h(x, y).
    - Snippet Body: specify additional methods, properties or variables, which were initialized once-only by calling the snippet.
  - right panel: global parameters, which can be used within the



## **Tabs: Source Code**

- Source Code tab :
  - left panel: source code in C# syntax
  - right panel: global parameters, which can be used in snippet.
  - bottom:
    - Import Snippet : import a snippet from a .snp-file.
    - Export Snippet 2: export a snippet into a .snp-file. This file can be used to import the snippet to other programmable objects.
    - Check Consistency: check if the snippet is in correct C# syntax. If there is an inconsistency, users will find details by clicking

The Check Consistency Validity: A	OK Cancel Help

Fig: source code editor of Programmable Interface

### **Tabs: Global Parameters**

- Global Parameters tab allows users to define different types of global parameters, even predefined interfaces, materials and much more.
  - Global parameters can be manually defined within the programmable object, outside the Source Code Editor.
  - Global parameters can be used in Parameter Run and Parametric Optimization.

Source Code Editor	– 🗆 🗙			
Source Code Global Parameters Snippet Help Advanced Settings		Source Code Editor		— 🗆 X
General Parameters		Severa Cada Catal Da La Catal da	10.00	
Variable Name Type Description		Source Code Global Parameters Snippet Help Adva	anced Settings	
R Double Value Velue Value: 500 mm (Allowed m	nge: 0 m 1 m)	.5 1  ☐ double height = 0.0;		ApertureDiameterX [double]
Double Value   Double Array 1D		5         1         □         double height = 0.0;           2         /************************************		ApertureDiameterY [double]
Double Array 2D		5 2 7		x [double]
Integer Value	Edit Programmable Interface	1	X DE HERE *********************************	y [double] R [double]
Boolean Complex Value	Remove Structure Height Discontinuit	es Scaling Periodization	/	Interface_1 [OpticalInterface]
Integer Vector 2D	Remove Interface Specification			
Global Interfaces	Algorithms		can be removed)	
Variable Name Interface	Add		3) * y / 10;	
Interface_1 Truncated Cone Grating Interface	Remove Snippet for Height Profile	🖉 Edit Validity: 🕑		
	👔 🌗 💿 Numerical Gradient (	Calculation Accuracy Factor		
	O User-Defined Gradie	nt Calculation		
Reference Field (2D Data Array)	Parameters			
Set Show Remove	Farameters			
	R	500 mr	Samples and share and and	سوالو کر در شور کر بر کرد شدور دختی و بر کی ای مورد مندور کرد. ا
Check Consistency Validity: 📩 🔳 OK C	ncel Help Interface_1: "Truncated C	one Grating Interface" 🖉 Load 🖉 Edit		

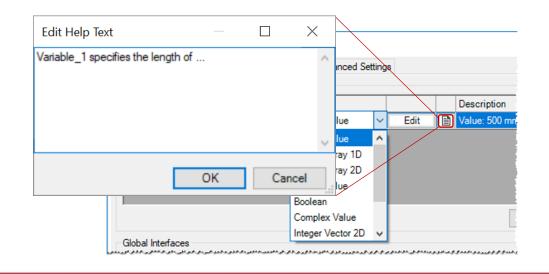
#### **Global Parameters: General Parameters**

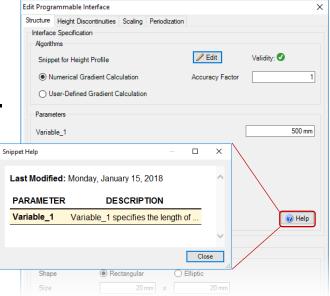
- General Parameters support several data types like Double, Integer, Boolean, Complex, Double Vector 2D and much more.
- Users are able to define additional properties for the general parameters like physical unit, minimum and maximum value and the valid range by clicking .

						Edit General Param	eter: Double Value		×
Source Code Editor						Name			Variable_1
Source Code Global Parameters Snippet	Help Advanced Set	ttings				Physical Quantity		Length	$\sim$
General Parameters						Value			500 mm
Variable Name	Туре				Description	Minimum Value			0 m
Variable_1	Double Value	~[	Edit		Value: 500 mm (Allowed				1
	Double Value	^				Maximum Value			1 m
	Double Array 1D						ОК С	Cancel	Help
	Double Array 2D								
	Integer Value								
	Boolean	-1							
	Complex Value				Add	Remove 👚	₽		
Global Interfaces	Integer Vector 2D	¥							
رهو المحمد الماليو والاخلاج والعلاهي الواطو التي الوالا المحي والالاتي الوردفين	و الد ماليد الذكر المو ماليد ال	A. S. A.	ر وروده و و ردو و در	وصحوه	المحمو الرام الرود المناكر الرفو ورود المدوى	بودبو دولو والو وروي المور المستحربو ال	الأسلاط ومدعران		

## **Global Parameters: General Parameters**

- It is highly recommended to specify a help text for each General Parameter by clicking on 
   Image: Comparison Comparison
- This help text is shown outside the source code editor by clicking





# **Global Parameters: System Building Blocks**

- Any predefined system building blocks in catalogs can be specified as global parameters.
  - materials
  - media
  - interfaces
  - boundary responces, i.e. transmission functions.
  - stacks

Global Materials			
Variable Name	Material		Add
Material_1	Carbon(amorphous)-a-C_(1975)		DDA
material_1	Carbon(anorphous)-a-C_(1373)		Remove
		1	4 1
Global Media			
Variable Name	Medium		Add
Medium_1	Aperture Medium Aluminum Pinhole 0.5mm		Remove
Global Interfaces			
Variable Name	Interface		Add
variable ivalle			
Interface 1	Truncated Byramid Grating Interface		744
Interface_1	Truncated Pyramid Grating Interface		Remove
Interface_1	Truncated Pyramid Grating Interface		
Interface_1 Global Boundary Respon			
Global Boundary Respor			
	nses Boundary Response		Remove
Silobal Boundary Respor Variable Name	nses Boundary Response		Remove
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ilobal Boundary Respor Variable Name Boundary_Response_	nses Boundary Response		Remove
Slobal Boundary Respor Variable Name Boundary_Response_ Slobal Stacks	nses Boundary Response 1 Cylinder Lens		Remove Add Remove

#### **Global Parameters: Reference Field**

- Other harmonic field can be used as *Reference Field*, as global parameter.
- It is super useful when users need infomation of both fields. E.g. In programmable detector, the reference field is defined as the desired field pattern. Values of merit functions can be calculated by comparing the detected field and *Reference Field*.



## Tab: Snippet Help

- Snippets Help tab helps user to record information about the programmable object and specify different parameters.
- Please read the use case Customizable Help for Programmable Element for more details.

Source Code Editor				×
Source Code Global Parameters Snippet Help Advanced Settings				
Title     Programmable Interface       Author     Hulying Zhong	Version Last Modified	1.0 9/21/2017		
This interface contains the following features: 1.				
Preview				
Programmable Interface Author: Huiying Zhong Version: 1.0				î
Last Modified: Thursday, September 21, 2017				~
Check Consistency Validity: ▲ <sup>2</sup>	ОК	Cance		Help

# **Tab: Advanced Settings**

- Advanced Settings tab allows you to define additional DLLs and namespaces, which can be used in the snippet.
  - Standard Usings: listing standard namespaces, which are used in the snippet
  - Additional Usings: user defined additional namespaces of the VirtualLabAPI DLL and the VirtualLab.Programming DLL
  - External Reference: importing additional DLLs

Source Code Global	Parameters Snippet Help Advanced Settings		
Standard Usings	using System: using System Collections.Generic; using System Drawing; using System IO: using VirtualLab.PF core BasicFunctions; using VirtualLab.PF (core BasicFunctions; using VirtualLab.PF) Core Data Visualization; using VirtualLab.PF) Core Functions; using VirtualLab.PF) Core Functions; VirtualLab.PF) Core Functions; Vir		<
Additional Usings	using MyDLL MyNameSpace;	E	dd dit nove
External Reference	C:\Users\Huiying Zhong\OneDrive\Huiying_LightTrans\2017-12\AperiodicFMM.dll	Add (Ab Add (Re Rem	elative)

## **Document Information**

title	Source Code Editor
version	1.0
VL version used for simulations	7.0.3.4
category	Feature Use Case