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Agilent Technologies

MBP

Optimization Weight Setting

Application Note

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Optimization Weight Setting

Application Note

This application note describes how to set weight in Model Builder Program (MBP). **Note:** This document was originally released for MBP V2011.1.0 in August 2011.

Introduction

In MBP, weight can be separately assigned to device and curve. The weight setting takes effect when calculating root-mean-square (RMS) and thus, affects the final optimization result. When weight is set on one curve, all points on that curve inherit the weight value. In MBP, the default value of weight is always "1." In this document, we introduce the steps to set weight for device and curve, respectively. For more information go to www.agilent.com/find/eesof or contact your local Agilent office. The complete list is available at: www.agilent.com/find/contactus.

Device Weight Setting

MBP allows the user to set different weights for different devices when running the optimization. Here, "weight" means the part's weight in the whole integration. For example, the default weight for every device in MBP is "1," so the RMS values of all devices are multiplied by 1 (e.g., they remain unchanged). Since the built-in optimizer implements optimization according to the RMS value, it treats all devices with the same importance. However, if the user sets the weight value of one device as "2," then the RMS value of this device will be multiplied by 2 and the optimizer will treat it with much more importance than ordinary devices with a weight of "1."

To enable this feature, choose "Extraction -> Weight Setting" from the main menu. The weight setting dialog will pop up as shown in Figure 1.

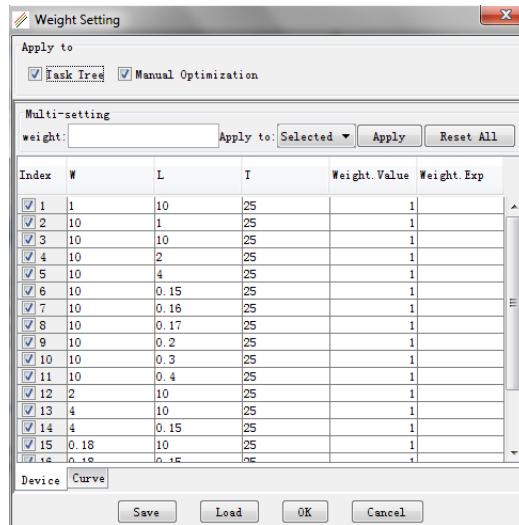


Figure 1. Weight setting for device

At the top of this dialog window there are two check boxes that allow the user to apply the weight settings to either Task Tree or Manual Optimization. The user can also check both options. In the "Multi-setting" panel, the user can chose to apply the weight setting to the "Selected" devices or "All" devices. As for weight, the user can either directly input the value or use the expression.

For example, as shown in Figure 2, weight is set as an expression given by $W/L*T$. After clicking the "Apply" button, the values and expressions in the column "Weight.Value" and "Weight.Exp" will be updated. Device instance parameters (such as W, L and T) may be employed in the expression.

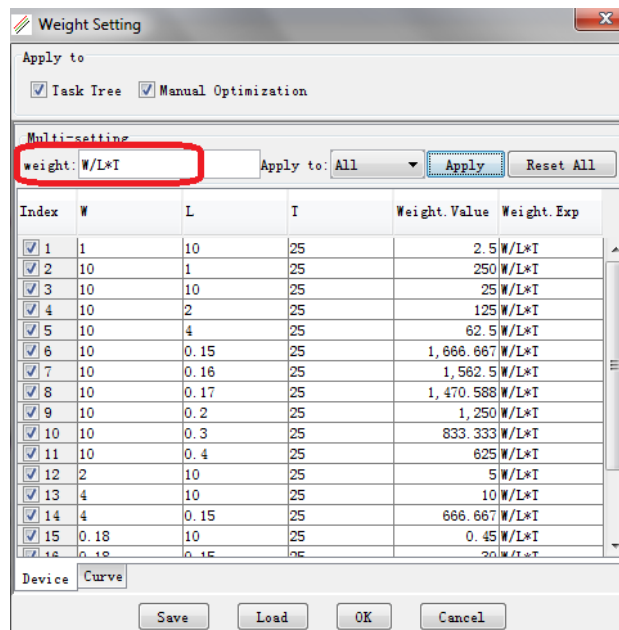


Figure 2. Weight expression

MBP supported operator and functions are listed in Tables 1 and 2, respectively.

Support Operator	Symbol
Power	^
Boolean Not	!
Unary Plus, Unary Minus	+x, -x
Modulus	%
Division	/
Multiplication	*
Addition, Subtraction	+, -
Less or Equal, More or Equal	<=, >=
Less Than, Greater Than	<, >
Not Equal, Equal	!=, ==
Boolean And	&&
Boolean Or	

Table 1. Support operator

Support Function	Symbol
Sine	sin()
Cosine	cos()
Tangent	tan()
Arc Sine	asin()
Arc Cosine	acos()
Arc Tangent	atan()
Hyperbolic Sine	sinh()
Hyperbolic Cosine	cosh()
Hyperbolic Tangent	tanh()
Inverse Hyperbolic Sine	asinh()
Inverse Hyperbolic Cosine	acosh()
Inverse Hyperbolic Tangent	atanh()
Natural Logarithm	ln()
Logarithm base 10	log()
Angle	angle()
Absolute Value / Magnitude	abs()
Random number (between 0 and 1)	rand()
Modulus	mod()
Square Root	sqrt()
Sum	sum()

Table 2. Support function

Curve Weight Setting

The weight can also be set in curve level. To do so, click the “Curve” tab to switch to the interface as shown in Figure 3.

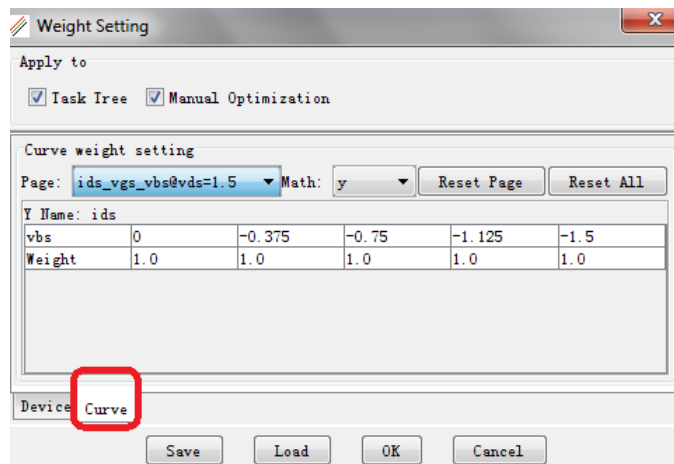


Figure 3. Weight setting for curve

First, the user needs to define a plot. As shown in Figure 4, this is done by choosing one page from the drop-down list, for example, “ids_vgs_vbs@vds=1.5.”

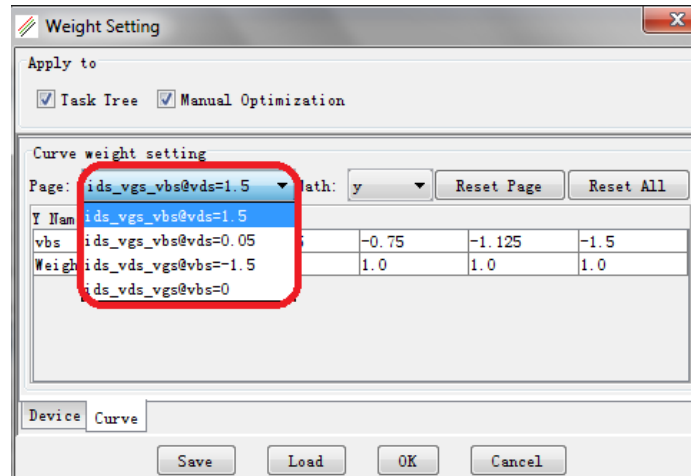


Figure 4. Set page

Next, the user selects a math transform from the drop-down list as shown in Figure 5. This is important because the user may be interested in $I_d V_g V_b$ or $G_m V_g V_b$ (the derivative of $I_d V_g$) during the optimization. Choosing different math transformations can distinguish between these two plots.

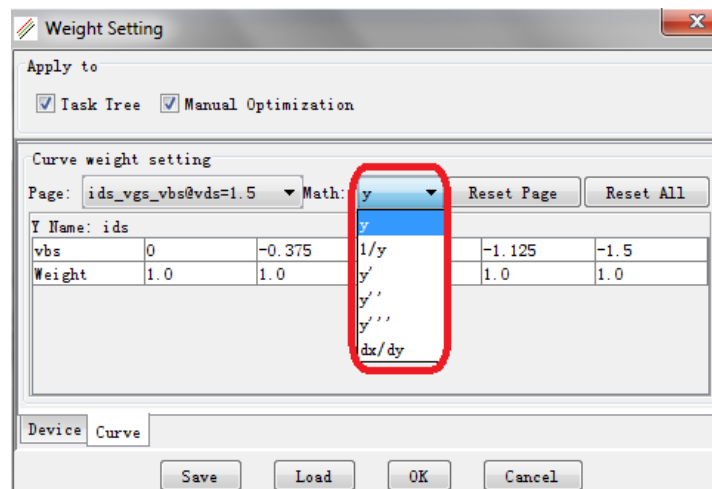


Figure 5. Set math

The weight setting can also be accomplished by editing the value directly in the table. Note, however, that the final weight value of one curve needs to be multiplied by the weight of its device. So, the total weight of one curve is equal to $device_weight * curve_weight$.

After all settings are done, click the "OK" button to save and close the window. All of the selected settings will be immediately activated.

