Manual
for SpectrumMeasurement program
ver. 0.1

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1 Introduction

The SpectrumMeasurement program is used to measure the LI and IV curve of laser diodes using current source, temperature controller and power meter. All the instruments are wrapped in according matlab classes.

2 Usage

The program can be called through the command "SpectrumMeasurement" in Matlab. Make sure the classes of all the instruments that you are going to use are in the same directory as "SpectrumMeasurement.m" or can be accessed by Matlab through pathdef. If everything goes well, the first window you can get is shown in Fig. 1

You can use the OSA along with current source and temperature controller or use the OSA alone. This is controlled by the toggle button "Single". Now the toggle button is not pressed and is shown "Single". In this mode, the "GPIB address of Current Source" and "GPIB address of Temperature Controller" are disabled. If you want to use current source and temperature controller as well, just press down "Single" toggle button. Then the "GPIB address of Current Source" and "GPIB address of Temperature Controller" text edits will be enabled and "Single" text will change to "Full". The "Load Default" button is used to load the default parameters to overwrite the current parameters. The default setup is restored every time when the program is called. The "Save as Default" button is used to save the current parameters as the default setup. The "OK" button is used to accept the current parameters and continue to next window. The "Cancel" button is used to exit the program.

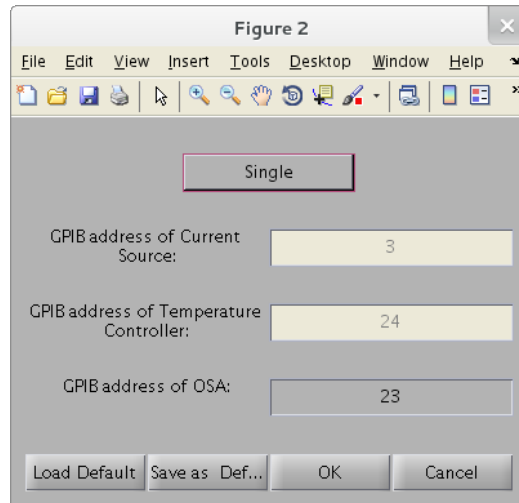After the "OK" button is pressed to accept the parameters, the Fig. 2 will be shown.

Figure 1: SpectrumMeasurement Setup

There are three panels in this window. Each panel represents an equipment and is plotted and controlled by the according class. The equipment name is shown in the title region of each panel. In Fig. 2, you can find "ILX3744B Continuous Current Source", "ITC503 Temperature Controller" and "Optical Spectrum Analyzer" in the title region. If you select single in the previous setup window, there will not be "ILX3744B Continuous Current Source" and "ITC503 Temperature Controller" panels.

In the "ILX3744B Continuous Current Source" panel, the first text edit called "Current Set" is to set the output current. You should press "enter" button in keyboard after the value is entered in this text edit to send the value to the current source. The following two texts("Current Output(mA)", "Voltage(V)") show the current and voltage information. These values will be updated periodically when the communication is established. The red text "Source NOT Connected" shows the connection status and it will change to green text "Source Connected" after the connection is established. The button below is used to connect to the current source. After clicked, if the connection is established, the text on the button will change to "Disconnect" and used to disconnect the current source. The red text "Output is OFF" shows the status of output enable. If the current output is enabled by clicking the "Output" button below, the red text will change to green text "Output is ON". There are two popup menus in this panel, one is for the operation mode of current source and the other one is to set the current range of current source. You can choose the proper one for your measurement.

In the "ITC503 Temperature Controller" panel, the "Connect" button and red text have the same function as mentioned above. The text bar below is used to
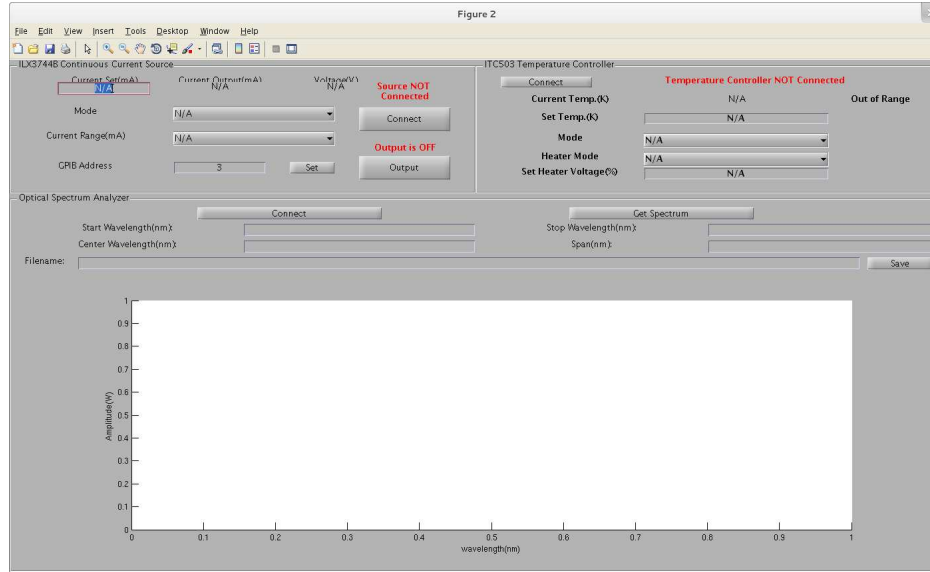
Figure 2: Main window

show the current temperature of the sensor which will be refreshed periodically when connected. The text "Out of Range" shows the state of temperature stability. Once the temperature is within 0.1K away from the set temperature, it will show "Stable". The text edit below is used to set temperature. You should press "enter" to confirm the set temperature. The "Mode" popup menu is used to show the operation mode of the temperature controller. This parameter is to set how you can operate the controller (remote or local) and whether to lock the front panel of the controller (locked or unlocked). To have our gui remote controller work, this has to be set as "Remote&Locked". The popup menu below is used to set the operation mode of heater and gas control. Since we don't have a gas controller, the only thing that matters to us is the heater mode(Manual or Auto). If the heater mode is set to be manual, the heater voltage below will be used to set the heater power level.

In the "Optical Spectrum Analyzer" panel, first there are two push buttons. The "Connect" button is used to establish the connection to the OSA. The "Get Spectrum" button is used to acquire the current spectrum from OSA and show this spectrum in the axes below. There are four text edits named as "Start Wavelength", "Stop Wavelength","Center Wavelength" and "Span". The relation between these four values is as follows:

$$\text{Center Wavelength} = \frac{\text{Start Wavelength} + \text{Stop Wavelength}}{2}$$
$$\text{Span} = \text{Stop Wavelength} - \text{Start Wavelength}$$

(1)

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When you change one of these values, the other three will be updated automatically in both program and OSA. The "Save" button is used to save the spectrum data in "mat" format with the filename defined by the "filename" text edit.