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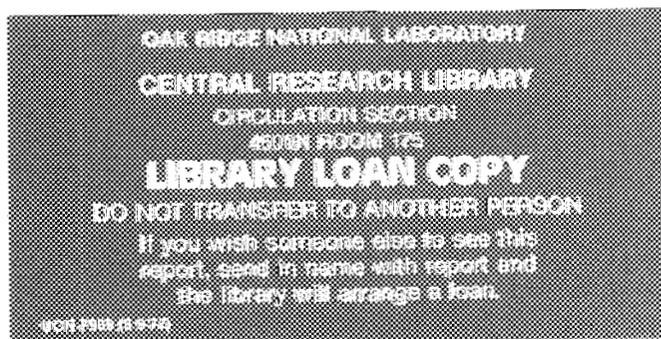
ORNL/TM-12020

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NATIONAL
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MARTIN MARIETTA

ORGBUG – A Windows-Based Combinatorial Geometry Debugger

T. J. Burns



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**ORGBUG - A WINDOWS-BASED COMBINATORIAL
GEOMETRY DEBUGGER**

T. J. Burns

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Abstract

ORGBUG is the second half of a two part graphical display and debugging system for combinatorial geometry. The first part of the system consists of a "view" generator, CGVIEW. ORGBUG itself is a Microsoft Windows-based application designed to run on a 386 personal computer and to display the "view" produced by CGVIEW as an aid to debugging. ORGBUG also includes specific tools to facilitate the identification of geometric features which are inconsistent or in error.

1. INTRODUCTION

ORGBUG is the second half of a two part graphical display and debugging system for combinatorial geometry. The first part of the system consists of a "view" generator, termed CGVIEW, which is documented in a separate report[1]. ORGBUG is a Microsoft Windows-based application[2] designed to display the "view" produced by CGVIEW as an aid to debugging.

ORGBUG is currently a "work in progress". Some of the options and features that are planned for the application have not yet been implemented. However, because of the utility of this program (and its companion program, CGVIEW), a preliminary version of this program is being released.

ORGBUG consists of a single executable file ORGBUG.EXE which is installed as a Windows application. To install ORGBUG, the EXE file is copied to an appropriate directory. Selecting File Open from the Program Manager menu and completing the resulting dialog box will add ORGBUG to the designated program group. ORGBUG is designed to run in the enhanced 386 mode of Windows Version 3.0 or 3.1.

ORGBUG is structured to utilize the image files generated by its companion program, CGVIEW. It permits the image to be displayed as a monochrome wireframe, or as a color representation. For color images, the colors can be mapped to either materials, regions, or zones comprising the original combinatorial geometry. The particular colors, if desired, can be user-assigned. ORGBUG can also be used as a geometry debugger. Provision for identifying specific zones, bodies, and surfaces, visible on the image is provided so that verification of specific details in the CG model can be accomplished.

Currently, ORGBUG has no provisions for hardcopy output of the displayed image. However, it is capable of exporting the image as either a BMP or PCX file for further processing in other graphics programs. Additionally, it can copy the image to the Windows clipboard to facilitate the transfer of the image to other Windows-based graphics programs.

2. USING ORGBUG

2.1 STARTING ORGBUG

ORGBUG is designed to behave like a standard Windows application. To start ORGBUG, move to the appropriate program group, and double click on the ORGBUG icon. A ORGBUG window as illustrated in Figure 2.1 appears.

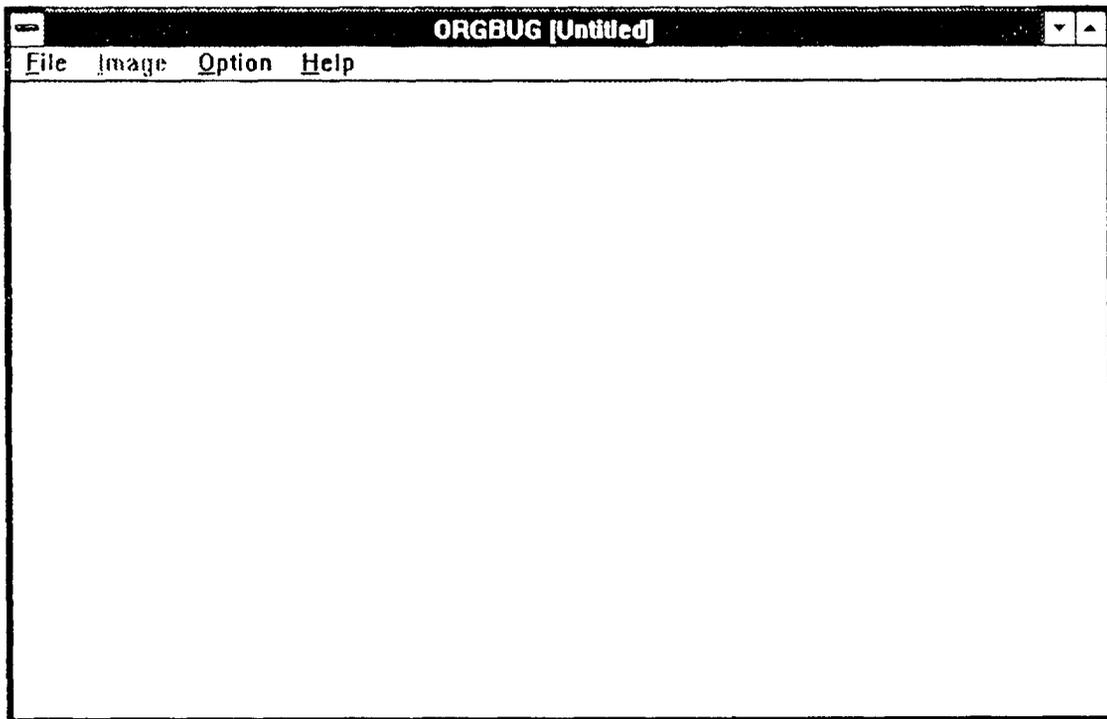


Figure 2.1 ORGBUG Main Window.

2.2 DISPLAYING A VUE FILE

Select Open from the file menu (see Figure 2.2). A dialog box similar to Figure 2.3 will be displayed.

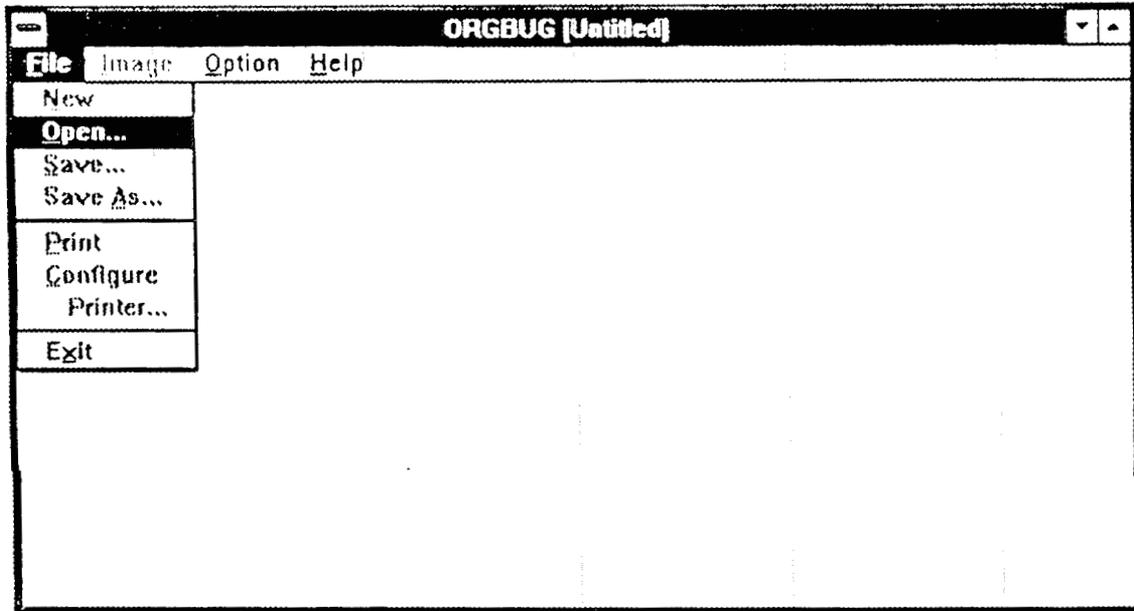


Figure 2.2 ORGBUG File Menu.

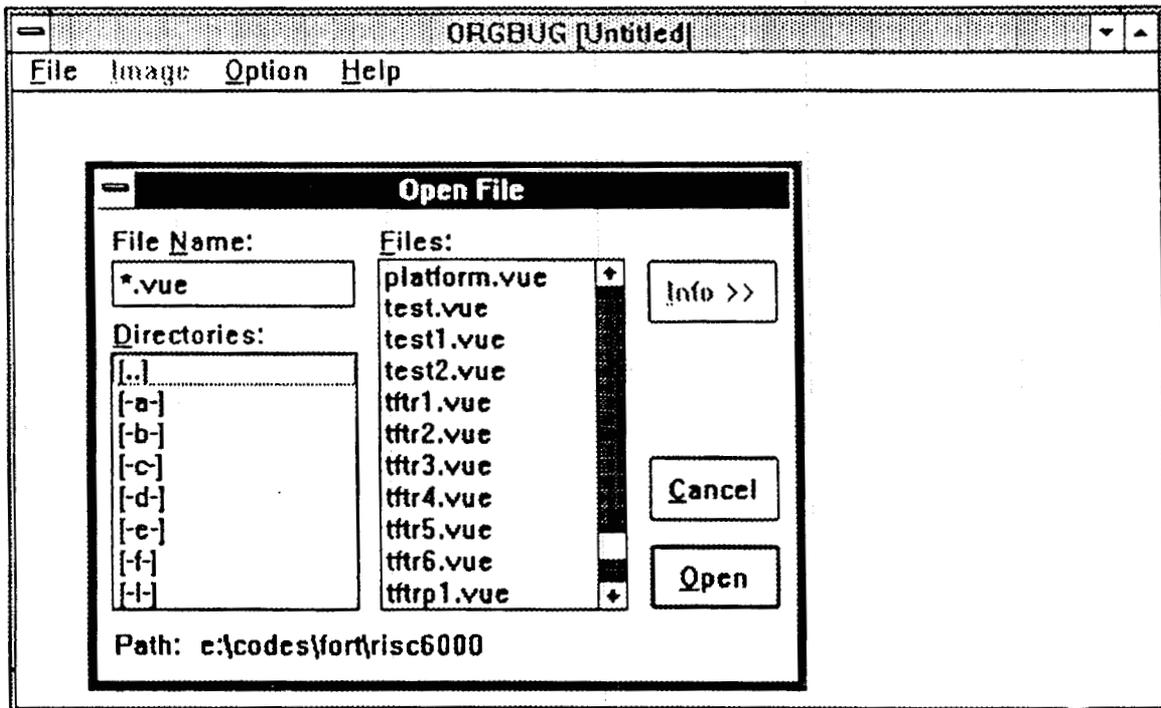


Figure 2.3 ORGBUG Open File Dialog Box.

The Open File dialog box is basically a standard Windows dialog box, allowing the current disk and/or directory to be changed and a specific file name to be selected. A file is selected by highlighting the file name (see Figure 2.4) and choosing the Open button. Alternatively, one can just double-click on the file name to automatically open the file.

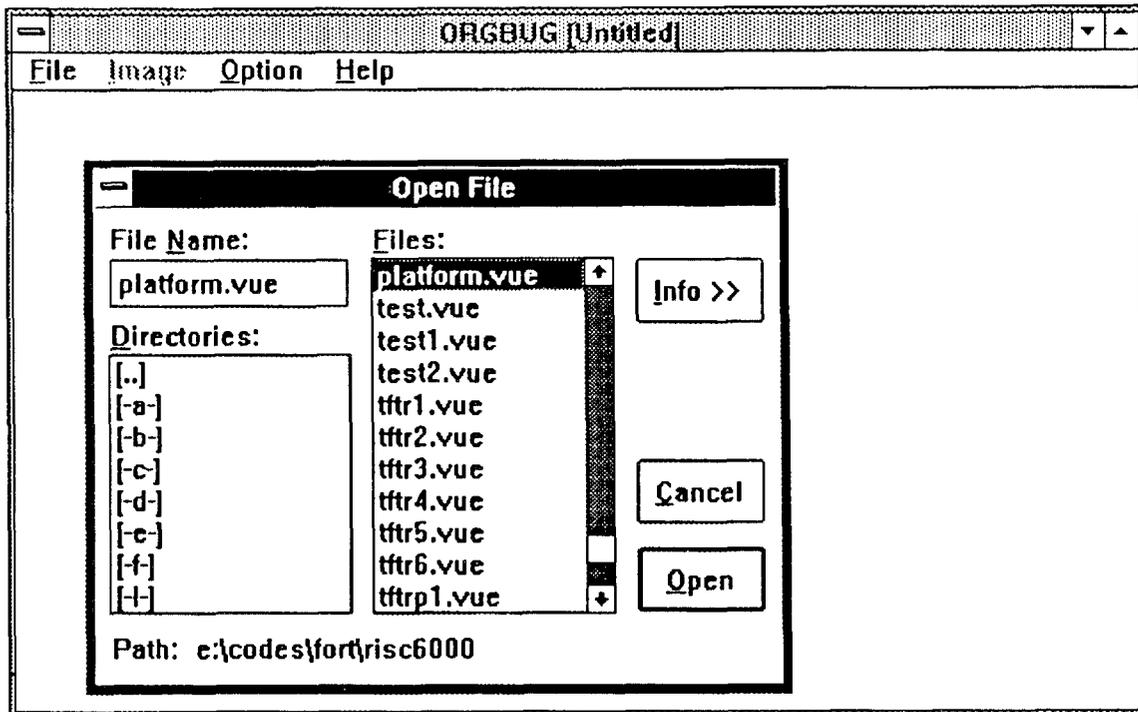


Figure 2.4 ORGBUG Open File Dialog Box.

Also, provided as part of the Open file dialog box is an Info button. Selecting this button will display the summary information contained in the header of the highlighted VUE file (see Figure 2.5).

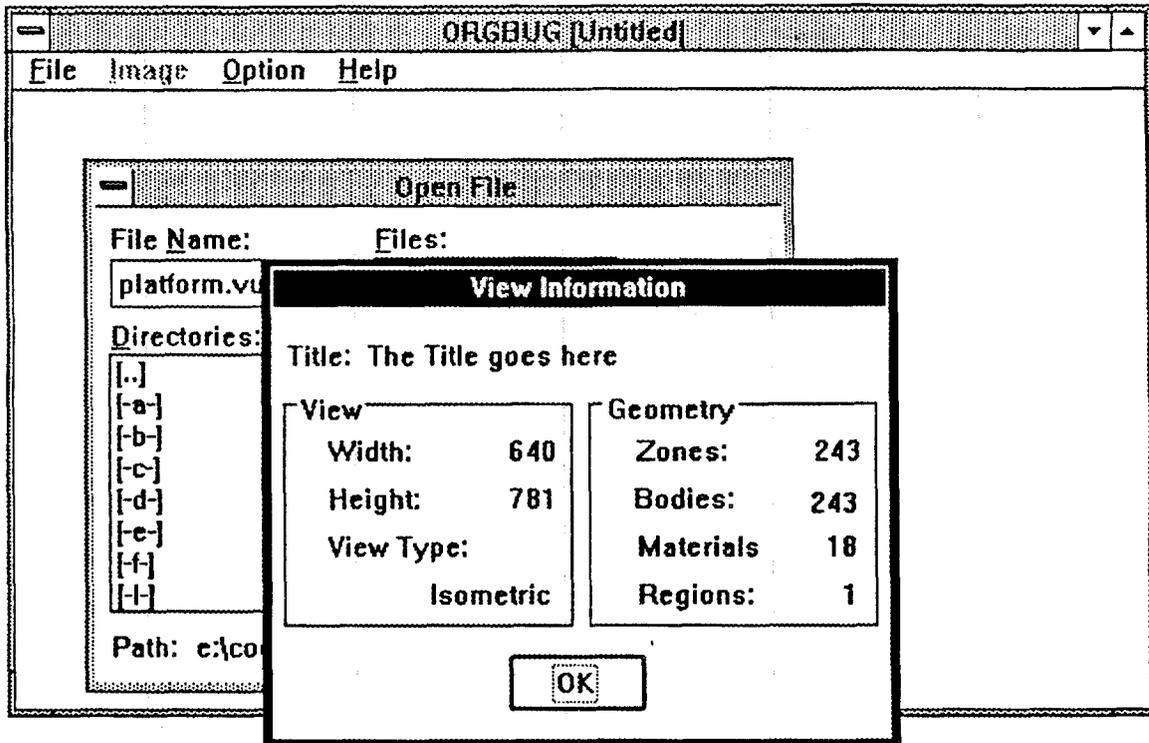


Figure 2.5 ORGBUG View Information Dialog Box.

This feature allows a user to verify that the selected file is indeed the desired one. Note that the default extension for the files created by CGVIEW is VUE. While this extension is not a requirement, only files formatted by CGVIEW can be read by ORGBUG.

When a file is selected via the Open File dialog box, the Display Parameters dialog box illustrated by Figure 2.6 is displayed.

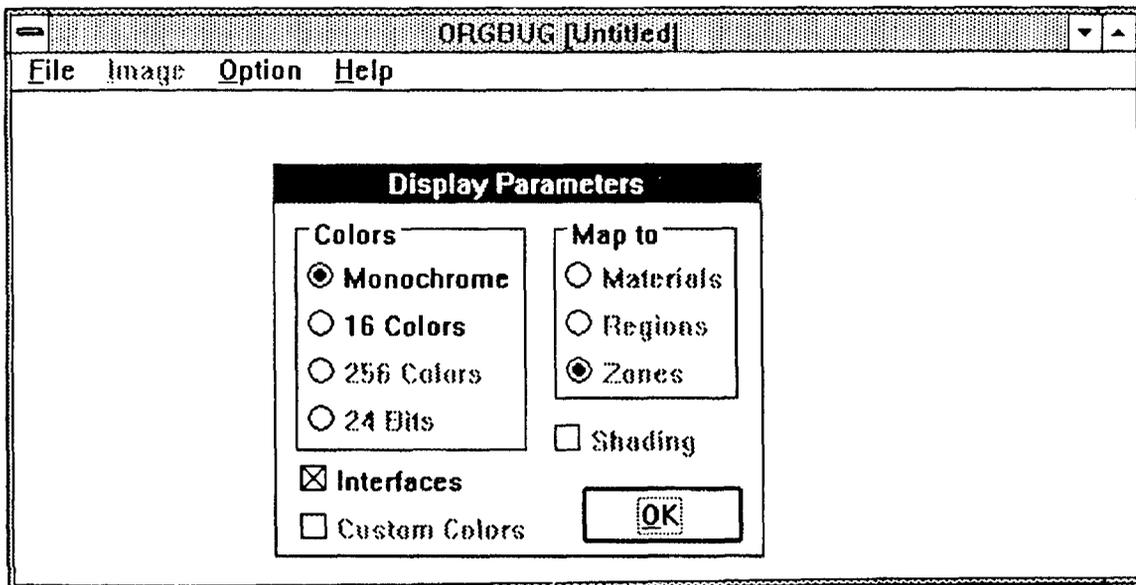


Figure 2.6 ORGBUG Display Parameters Dialog Box.

This dialog box allows the user to specify how the image contained in the VUE file is to be displayed. The available options are somewhat hardware dependent. For example, the various color options will not be available on a monochrome system.

Assuming that color-capable hardware is being used, the user can select either a monochrome display (i.e. a wireframe) or a color display. If a color image is selected, the various colors can be mapped to either materials, regions, or zones of the CG image (see Figure 2.7).

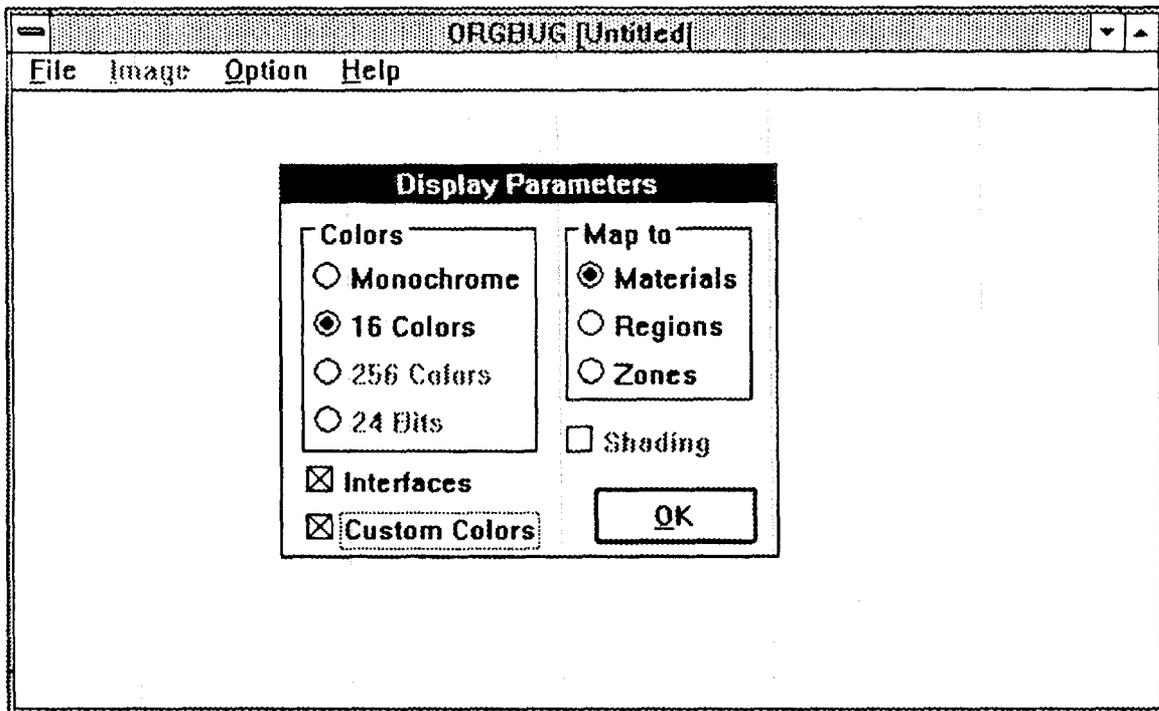


Figure 2.7 ORGBUG Display Parameters Dialog Box.

A checkbox is provided to optionally display the interfaces between the various objects that comprise the CG view. An interface is defined as a change in the zone, body, or surface id within the image. If chosen, the interfaces are depicted as black lines on the displayed image. It should be noted that if a monochrome image is selected, the interface checkbox is automatically selected and can not be deselected.

Selecting the OK button will display the selected VUE file using the currently selected display parameters. Selecting the Cancel button will return to the Open File dialog box. If a color image is selected an additional option is provided, a checkbox, labeled Custom Colors, which by default is not selected. In this situation, the program assigns default colors from the palette to the appropriate objects to be mapped (materials, regions, or zones). If the Custom Colors checkbox is selected however, exiting the Display Parameters dialog box will produce the Color Assignment dialog box illustrated in Figure 2.8.

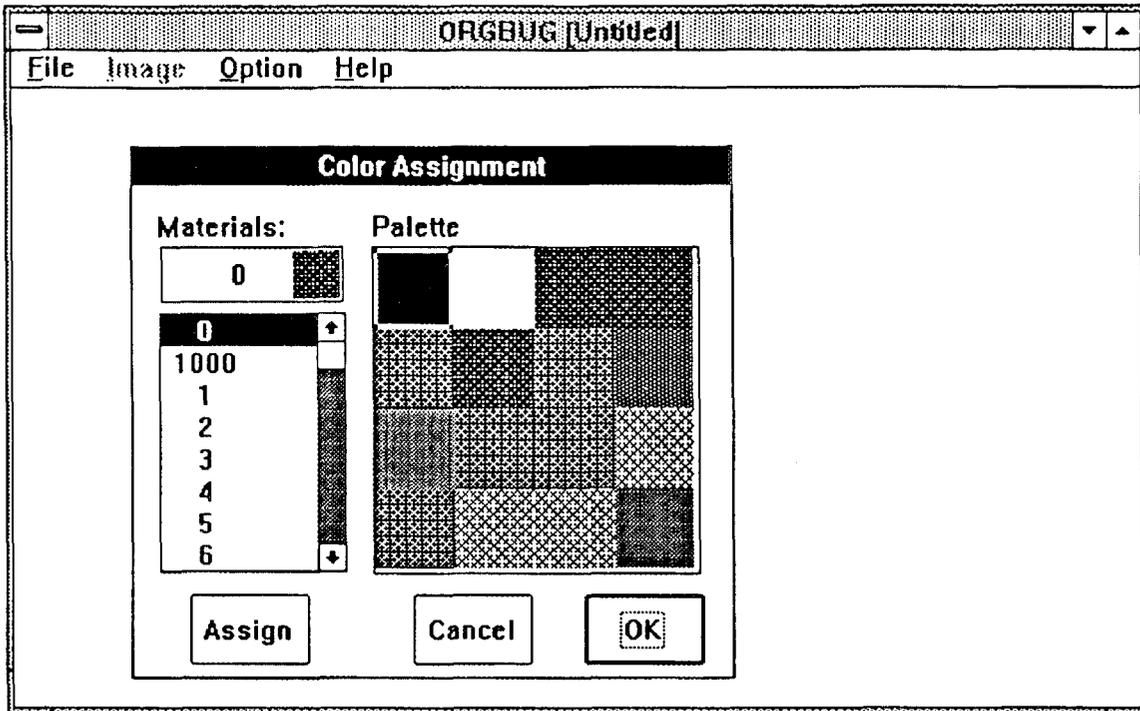


Figure 2.8 ORGBUG Color Assignment Dialog Box.

This box consists of a List Box in which the ids of the specified objects to be mapped are listed and an array of color buttons. (Note that due to publication limitations the various colors are depicted as patterns in Figure 2.8). The current color assignment of the selected id is displayed in the small box at the top of the List box. Matching object ids and colors consists of selecting (highlighting) an id, selecting a particular color button, and then choosing the Assign button. Alternatively, one can double-click on an property id to automatically assign the currently selected color or double-click on a color button to assign that color to the selected property id.

Choosing OK in either the Display Parameters or Color Assignment dialog boxes will initiate reading of the VUE files and subsequent display of the image as illustrated in Figure 2.9. To view images larger than the ORGBUG window, either the window can be enlarged or the scroll bars can be utilized to pan across the image.

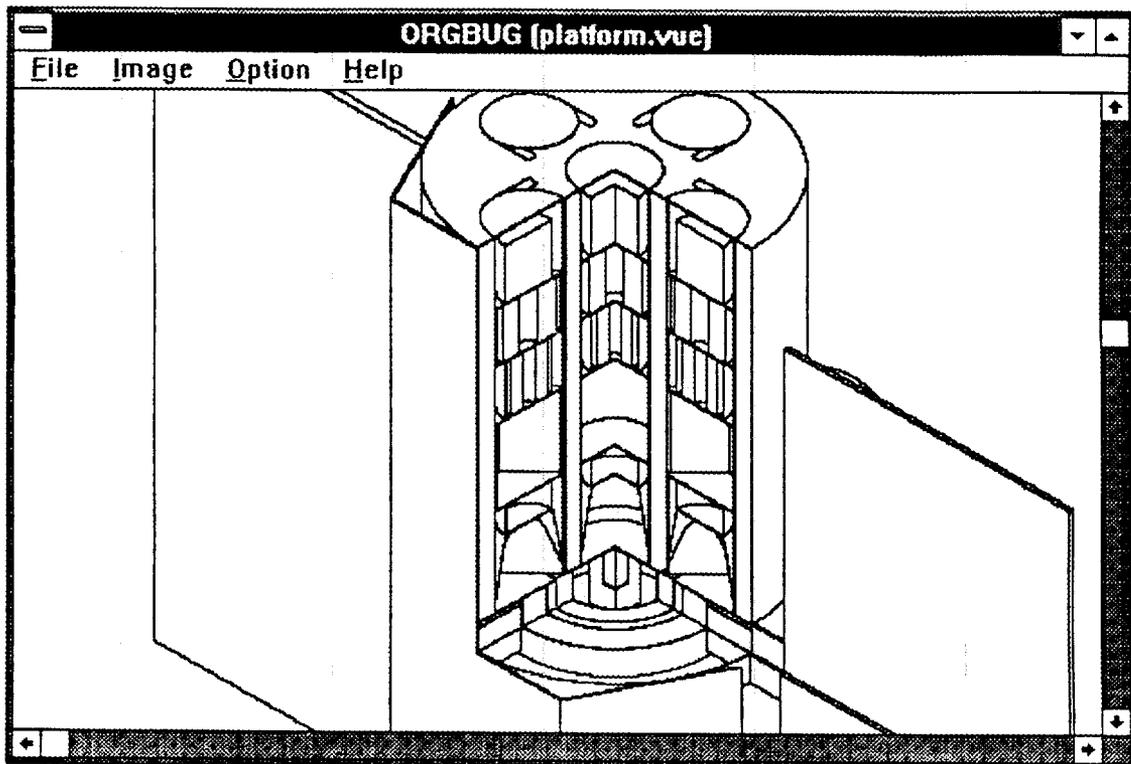


Figure 2.9 ORGBUG Main Window (platform, vue).

2.3 USING THE TRACKING OPTION

Once an image is displayed, ORGBUG can be used as a debugger. Click on the Option Menu and select Track. A dialog box similar to that illustrated in Figure 2.10 will appear, and the cursor will be modified to indicate that the tracking option is active.

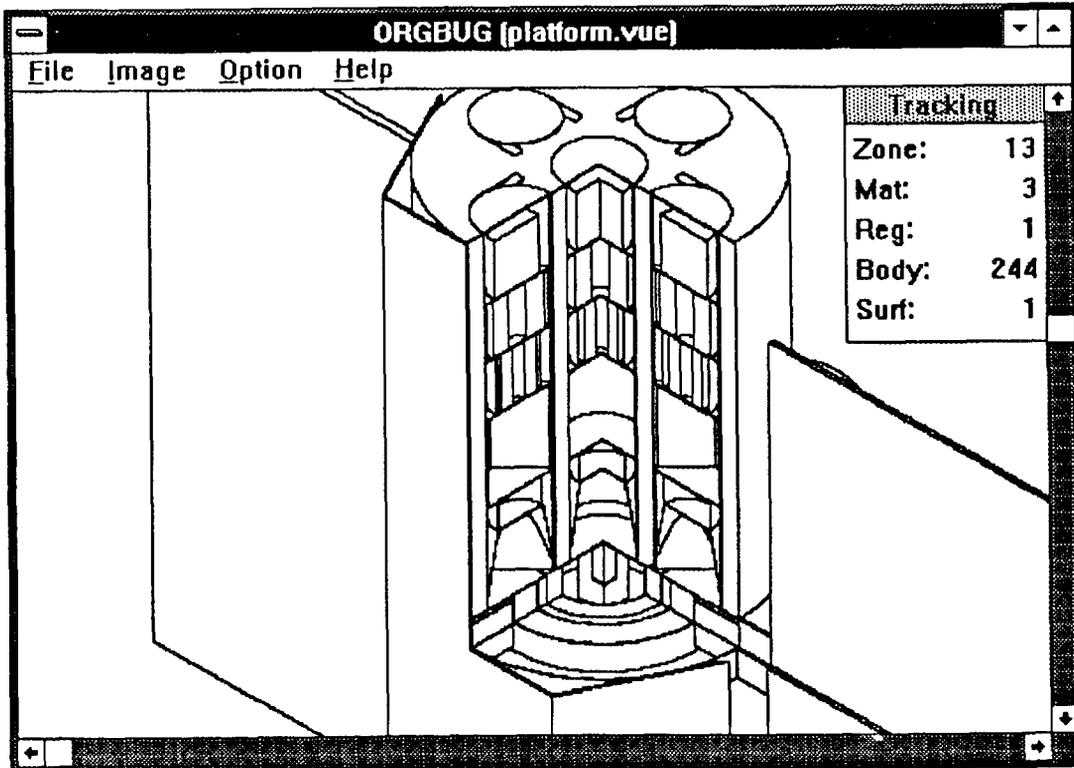


Figure 2.10 ORGBUG Tracking Dialog Box.

Moving the cursor over a particular region of the image and clicking the Right mouse button will update the Tracking box with the new values representing the object directly under the cursor. Alternatively, the Right mouse button can be held down and the cursor moved across the image to give a continuous readout of the image identification parameters. Selecting Track from the Option menu a second time will toggle this feature off.

2.4 SAVING THE IMAGE TO A FILE

Select the Save option from the File Menu. The dialog box depicted in Figure 2.11 will be displayed. As indicated by Figure 2.11, currently the image can be saved as either a BMP (Microsoft bitmap) or a PCX file. Either file type can be stored as a compressed file.

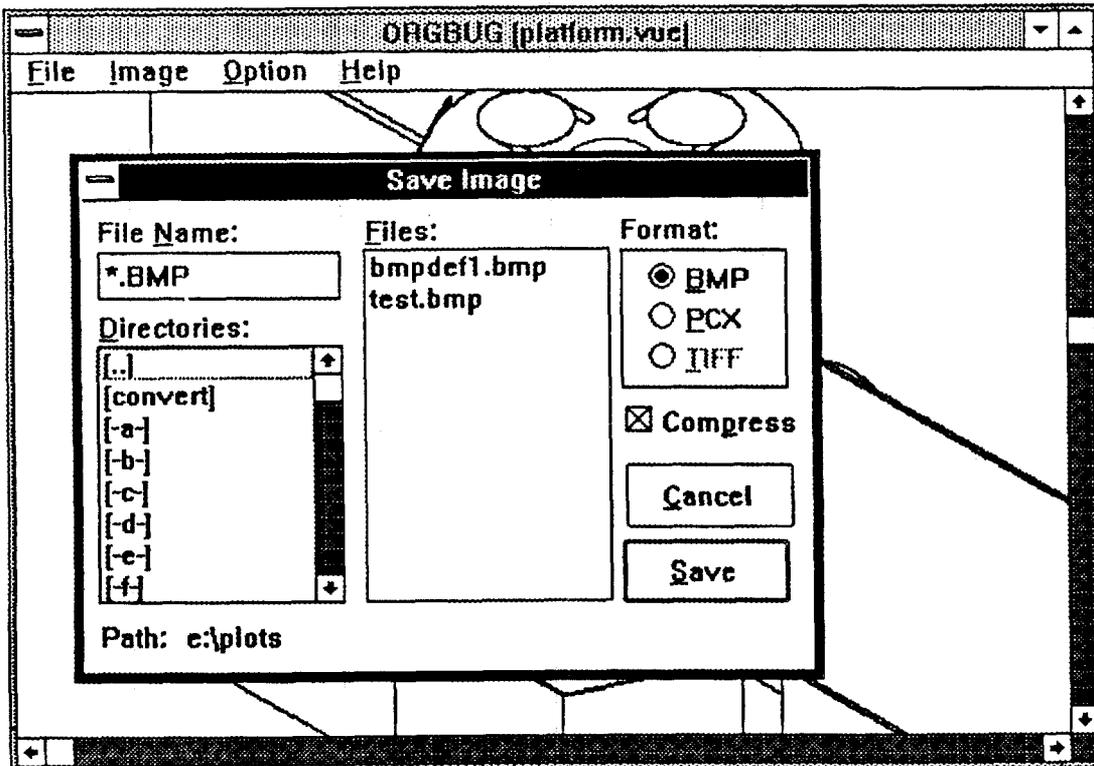


Figure 2.11 ORGBUG Save Image Dialog Box.

However, it should be noted that very few other programs recognize compressed BMP files or uncompressed PCX files. Therefore, it is recommended that PCX files be compressed, and BMP files be uncompressed. A user selects an appropriate file name, either by editing the File Name entry or by selecting an existing file from the List box. Selecting the Save button will create the appropriate file in the directory displayed by the Path entry. If there is the selected name is that of an existing file, a warning dialog box will appear to confirm that the existing file should be overwritten.

2.5 COPYING THE IMAGE TO THE WINDOWS CLIPBOARD

ORGBUG currently has no provision for hard copy output (i.e. the Print selection on the File Menu is disabled). However, by copying the image to the clipboard, it can be pasted into another Windows application which does provide for hard copy output (e.g. Microsoft Paintbrush). Select Copy from the Image menu to copy the currently displayed image to the clipboard. The current image is copied to the clipboard in the currently specified format - replacing any existing image. The default clipboard format is the Microsoft Bitmap

format (not to be confused with the BMP file format). The default format for images copied to the clipboard can be changed via the Options menu - the choices being the default (Bitmap) or the Device Independent Bitmap (DIB) format. It should be noted that very few programs currently recognize the DIB format.

Selecting the Clear Option will remove all images placed on the clipboard by ORGBUG.

3. FUTURE PLANS

As noted above, ORGBUG is currently a work in progress. As time and resources permit, it is anticipated that the options which are disabled in the current version will be implemented.

The primary emphasis of this effort is being directed at porting this application (and the corresponding CGVIEW) to the IBM RISC 6000 workstation. It is anticipated that once this port is successful, future development and extension of the capability of ORBUG will be directed primarily toward the workstation version.

4. REFERENCES

1. T. J. Burns, "CGVIEW - A Program to Generate Isometric and Perspective View of Combinatorial Geometries", ORNL/TM-12019, Oak Ridge National Laboratory, July 1992.
2. "Microsoft Windows User's Guide", Version 3.0, Microsoft Corporation 1990.

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