

2 *INSTALLING SMS*

PC Installation

SMS can be installed on PC's using a two step process. In the first step, *SMS* is copied from the installation diskettes to the hard drive. During the second step, *SMS* is "registered" on your computer by establishing authorization to run *SMS* on the hard disk.

1. **Start up Windows.** The *SMS* installation program is a *Microsoft Windows* application. Therefore, if you are not already within *Windows*, start it up now.
2. **Insert Disk1** of the *SMS* distribution diskettes.
3. **Select the RUN command.** In the program manager, select the *RUN* command from the file menu.
4. **Run the installation program.** In the command line box, type `<src>:install`, where `<src>`: is the disk drive where you have just placed Disk1. For example, if Disk1 is in your A drive you will type:

```
A:install <RETURN>
```

This will start the *SMS* installation program. A dialog briefly describing what the installation program will do will appear.

```
select OK
```

5. **Enter the location where you want *SMS* installed.** The install program will prompt for the path where *SMS* is to be installed. The default location will be the `C:\SMS`. If the default is OK then type:

```
<RETURN>
```

6. **Specify the files to be installed.** A dialog will appear allowing you to customize the installation process (see Figure 2.1). By default, the complete installation will be performed. If you do not want to install all files, select those that are appropriate.

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INTRODUCTION

This tutorial provides a general overview of *SMS*. It describes the major components of the interface (menus, tool palette, windows, etc.) and gives a brief introduction to the *SMS* modules.

TABS-MD vs. FESWMS-2DH

The *TABS-MD* code was originally developed by Norton, et al. (1973) of Resource Management Associates, Inc. of Davis, California. The *TABS-MD* suite which consists of several separate programs can be used to calculate water surface elevations, water depths, flow velocities (*RMA2*), contaminant migrations (*RMA4*) and sediment transport (*SED2D*) of open flow systems. It can be used for either steady state models (flow at a single time) or dynamic models (flow that varies with time).

The *FESWMS-2DH* code was first developed for the Federal Highway Administration by David C. Froehlich. As with the *TABS-MD* programs, the *FESWMS-2DH* programs can be used to calculate steady state or dynamic water surface elevations and flow velocities. However, *FESWMS-2DH* differs from *TABS-MD* in that it easily handles flow control structures such as culverts and weirs, and allows easy integration of flow obstructions such as bridge piers directly in the two dimensional mesh. The *TABS-MD* programs require the use of one dimensional elements to approximate flow control structures and mesh modification to represent piers.

Both models support wetting/drying procedures for regions of the mesh. *TABS* provides the additional option of modeling marsh porosity in the mesh.

The finite element meshes and associated boundary conditions necessary for *TABS-MD* and *FESWMS-2DH* modeling may be created within *SMS*, then saved to model specific files containing the geometric description of the model and controlling boundary conditions. These files are then used to perform the analyses. Resulting solution files can be read into *SMS* to generate vector plots, color-shaded contour plots, time-history diagrams, and solution animation sequences. *SMS* can also be used with other finite element computer programs, provided they read and write files in either the *SMS*, *TABS-MD*, or *FESWMS-2DH* format.

GETTING STARTED

Before beginning this tutorial you should have installed *SMS* on your computer according to the directions in the previous chapter. If you have not yet installed *SMS*, please do so before continuing.

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To launch *SMS* follow the instruction for the appropriate machine:

PC

Start *SMS* by double clicking on the *SMS* icon in the *Windows Program Manager*.

UNIX

Go to the *SMS* directory and type *sms* at the command line.

THE SMS SCREEN

Once you start the program you should see a menu bar and three windows as shown in Figure 3.1. The layout of the items in the windows may differ slightly from what is shown, depending on whether you are running the PC version or the UNIX version. The *SMS* screen is divided into four main sections: the *Graphics Window*, the *Tool Palette*, the *Edit Window*, and the *Menu Bar*. An additional window used for two dimensional plots, the *Gages Window* appears when required.

There are four sections of tools in the *Tool Palette*. In the first section, three icons at the top represent the *SMS* modules. The second section is a set of tools used for manipulating the display. The third section is a set of module-specific tools. These allow selection, creation and editing of entities specific to the current module. The fourth section contains macros which are shortcuts for frequently used menu commands.

The *Edit Window* is used to edit coordinates, display prompts and print help messages.

- Using the mouse cursor, click on the icons at the top of the *Tool Palette* to switch between modules.

As you change modules, notice that some of the menus and some of the tools in the *Tool Palette* change. To keep the interface as simple as possible, you are only presented with the tools and menus associated with the current module.

- Move the mouse cursor to one of the menus, press the mouse button, and keep it depressed as you move the cursor down the menu highlighting the commands.

Note that a description of each command is presented in the right side of the *Edit Window* at the bottom of the screen. This is part of the on-line help provided in *SMS*. Help messages are also displayed as you move the cursor over items within a dialog box.

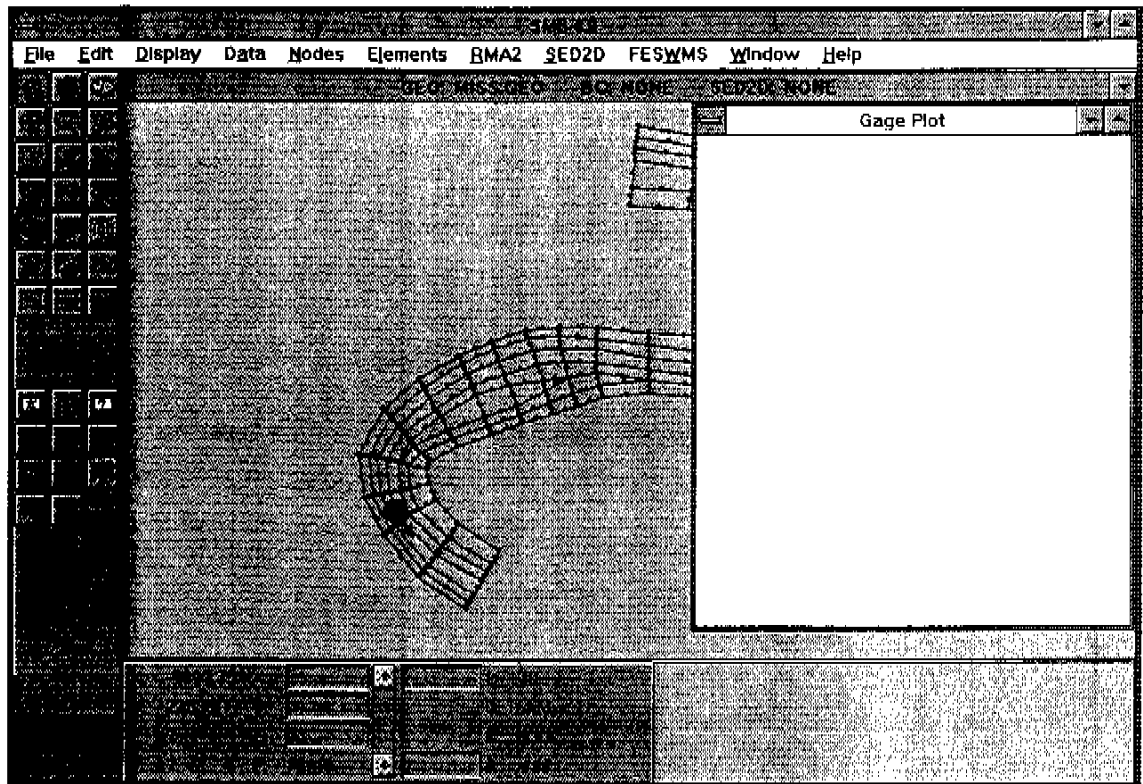


Figure 3.1. The SMS Screen.

IMPORTING TOPOGRAPHIC DATA

A common method of obtaining data points for *SMS* is from topographic data, such as a list of survey points. An ASCII file containing XYZ topographic data points can be created and then imported into *SMS*.

To import an XYZ file:

1. Select *File | Import*.
2. From the *Import Format* dialog which appears, choose the *XYZ* radio button and click the *OK* button or press the *Return* key.
3. Find and highlight the file *tut1.xyz*, and click the *Select* button.
4. The XYZ data points from the file have now been converted into *nodes*. Nodes are points representing locations of known position and elevation. The data in *tut1.xyz* is shown in Figure 3.2.

Any data represented by XYZ coordinates can be imported into *SMS* by following the above procedure. Nodes may also be created interactively. Refer to the *SMS* Reference Manual for directions in creating nodes.

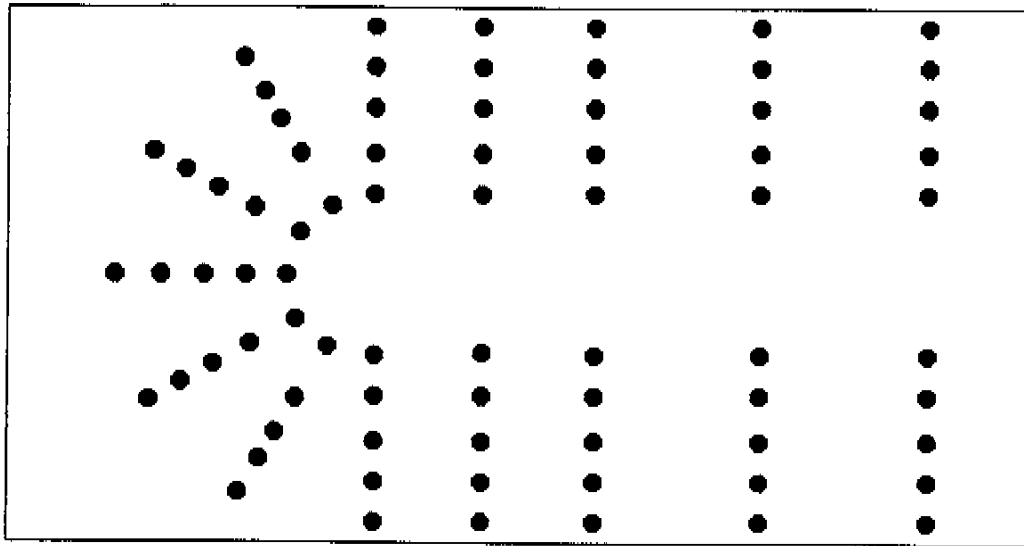



Figure 3.2. *The tit1.xyz Data Points.*


MANIPULATING THE VIEW

The dots on the screen represent the nodes of the mesh. When *SMS* reads a new set of geometric data, it centers the data on the screen and zooms in so the data fills the screen. We can quickly manipulate the view with the display manipulation tools in the *Tool Palette*.

The first way to manipulate the view is with the *Pan* tool.


1. Select the *Pan* tool  in the second section of the *Tool Palette*.
2. Move the cursor to the *Graphics Window*.
3. Drag the cursor left and right and up and down. An arrow will follow the motion of the cursor.
4. Release the cursor, and the data displayed in the window is translated to follow the last arrow and redrawn.

In some cases it is useful to magnify a region of the display. This is done using the *Zoom* tool.

1. Select the *Zoom* tool  in the second section of the *Tool Palette*.
2. Move the cursor to the *Graphics Window* and click the mouse button once. This magnifies the image by a factor of two.
3. Hold down the *SHIFT* key and click the mouse button once. This "zooms out" by a factor of two.
4. Choose a region of nodes and drag a box with the cursor that just encloses the region. This causes the region specified by the box to just fit in the screen.

5. Hold down the *SHIFT* key and drag a box with the cursor around the center quarter of the screen. This causes the region that filled the screen to just fit in the dragged box.

After manipulating the view with the viewing tools, it is often necessary to restore the view so that the entire set of objects in the *Graphics Window* can be seen.

- Select the *Frame Image* icon  in the bottom section of the *Tool Palette*. This centers the data in the middle of the screen.

CREATING THE MESH

After nodes have been created, elements are needed to build a finite element mesh. *SMS* provides numerous mesh generation techniques. This tutorial will review the procedures of *triangulation*. If you desire, you may observe the triangulation process. To enable this:

1. Activate the *Display Triangulation* option in the *General Options* area of the *Element Options* dialog.
2. Click the *OK* button or press the *Return* key.

To create a triangulated mesh from a series of data points:

1. Select *Elements | Triangulate*.
2. Since no nodes are selected, you will be prompted to triangulate all of them. Click the *Yes* button or press the *Return* key at this prompt.

When a mesh is triangulated, it creates quadratic elements (six-noded triangles), unless a linear element tool is selected. For analysis, the elements must be quadratic, but linear elements (nodes only at the triangle vertices) may be useful or the initial stages of mesh construction. For this tutorial, if linear elements were created by the triangulation, convert them to quadratic by choosing *Elements | Linear<->Quadratic*. The mesh should now be as in Figure 3.3. The green lines are contours connecting points of equal elevation.

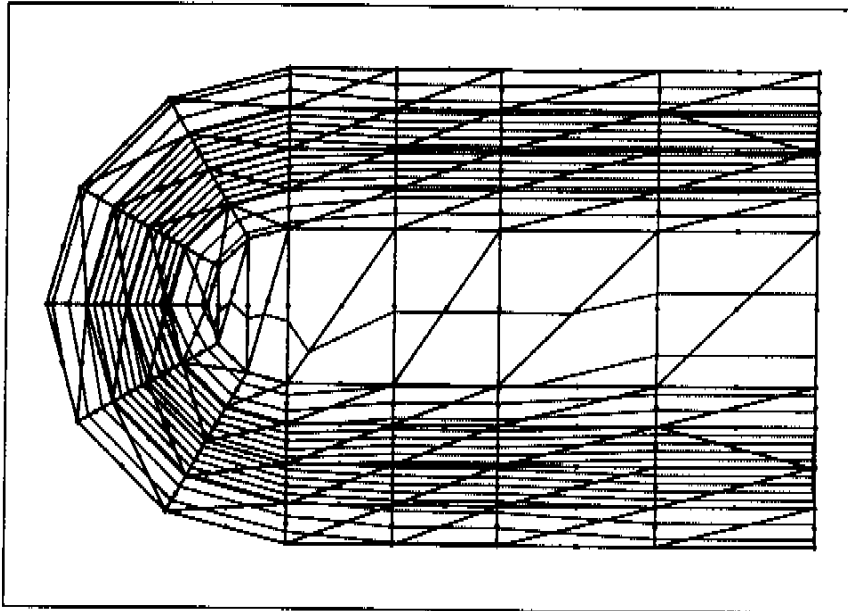



Figure 3.3. Results of Triangulating tut1.xyz.


DISPLAY OPTIONS

By default, nodes are displayed as small black dots. The display of nodes can be changed by using the *Display Options* dialog. For example to display nodes as large red dots:

1. Select the *Display Option* macro  in the bottom section of the *Tool Palette*.
2. Click on the *Nodes* color canvas to the left of the toggle box for the display of nodes. This causes the *Point Attributes* dialog to pop up.
3. Select the red color, and set the radius to 3.0.
4. Select *OK* on the *Point Attributes* dialog.
5. Select *OK* on the *Display Options* dialog.


CONTOUR OPTIONS

Contours are lines connecting points of equal value such as elevation or velocity. The contours on the mesh are displayed by default as a constant color. If your ".ini" file has been modified, the contours may be off by default. Therefore you may need to turn them on. The contour display can be changed using the *Contour Options* dialog. There are several ways to access this dialog including through the *Data* menu, the *Contour Options* macro, and the *Display Options* dialog.

- Select the *Display Options* macro  in the bottom section of the *Tool Palette*.
- Select the *Contour* toggle box if it is not depressed to enable contour display.

- Select the *Contour Options* button to the right of the contour item in the *Display Options* dialog.
- Select the *Specified interval* option from the left side of the dialog.
- Enter a contour interval of 0.5 (feet).
- Select the *Color Fill Between Contours* option from the right section of the dialog.
- Select the *OK* button.

The contours are now displayed at ½-foot intervals. To speed up the display for the following tutorials, it is advantageous to use linear contours. To do this:

- Select the *Contour Options* macro  in the bottom section of the *Tool Palette*.
- Select the *Normal Linear Contours* option from the right section of the dialog.
- Select the *OK* button.

CONCLUSION

This concludes the *SMS* overview tutorial. At this point you should have an understanding of some of the basic features provided by *SMS*. As mentioned in the introduction, you should now proceed to the tutorial in Chapter **Error! Reference source not found.** *Error! Reference source not found.* The data you imported and triangulated in this chapter will be used.

If you wish to exit *SMS* at this point:

- Select the *File | Quit* command.
- Select the *OK* button to confirm.

When you purchase *SMS*, a complete set of tutorials will be included. These will cover in detail each of the various modules and features of the program.