Part B

New features and enhancements in the program *ELPLA* 9.1

Determining
contact pressures, settlements, moments
and shear forces of slab foundations by the
method of finite elements

Version 9.2

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1 Enhancements in *ELPLA* 9.1 (MUI)

1.1 GEOTEC Office Applications with Multilingual User Interface

1.2 GEOTEC Office Language Settings

Now the user can define the language of the user interface and help system used in GEOTEC Office applications. To select or change GEOTEC Office language setting, start "GEOTEC Office Language Settings" tool by clicking on the program icon in the Windows ***Start-Menu> GEOTEC Office> GEOTEC Office Tools***. The language setting tool (Figure B-1) appears.

- In the "Display menus and dialog boxes in" list box, user can change the language of the menus and dialog boxes used in the GEOTEC Office applications. After selecting a new language, the user must quit and restart any Office applications he is currently using.

- In the "Display Help in" list box, the user can change the language of the Help system used in the GEOTEC Office applications.

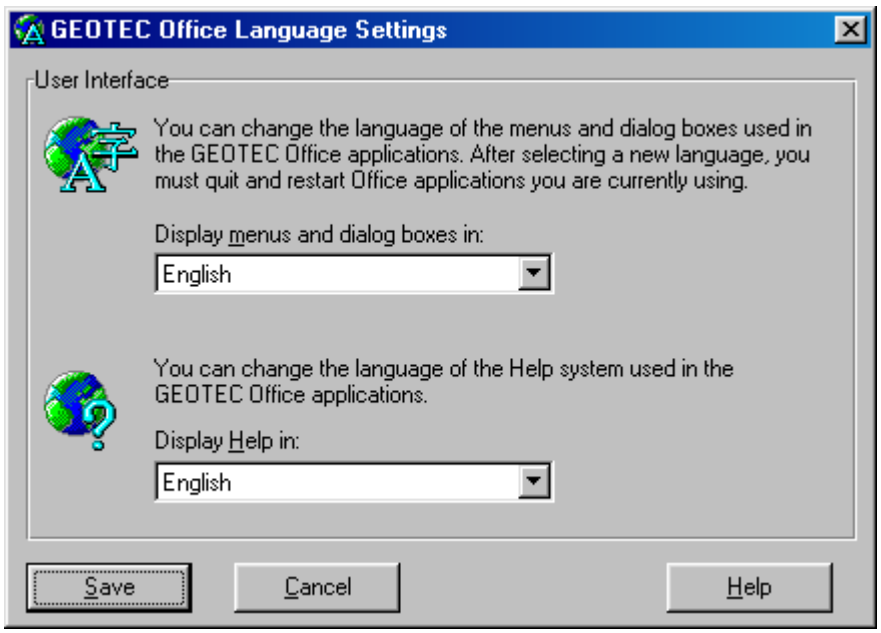

Figure B-1 "GEOTEC Office Language Settings" Tools

1.3 *ELPLA* Quick Tour

When you starting *ELPLA* for the first time, the "*ELPLA* Quick Tour" program (Figure B-2) appears. The tour program gives a quick access to the main contents of the *ELPLA* package as shown in Table B-1.

Table B-1 *ELPLA* Quick Tour Contents

Contents	**Description**
Tutorial	Taking the user step by step through some simple examples.

	These examples will help the user to become familiar with the most important functions of *ELPLA*.
Verification Examples	Verify the mathematical models used in program *ELPLA* by comparing *ELPLA* results with closed form or another published results. Illustrate how to use *ELPLA* for analyzing foundation by different subsoil models.
User's Guide	Display the complete User's Guide in a PDF-Format.
Start *ELPLA*	Start *ELPLA* to create a new project

In the "Show this screen each time *ELPLA* starts" check box, you can choose whether you need to start the Quick Tour program each time when *ELPLA* starting or not. Also, you can start the "*ELPLA* Quick Tour" program any time by clicking on the program icon in the Windows ***Start-Menu> GEOTEC Office> Welcome to ELPLA***.

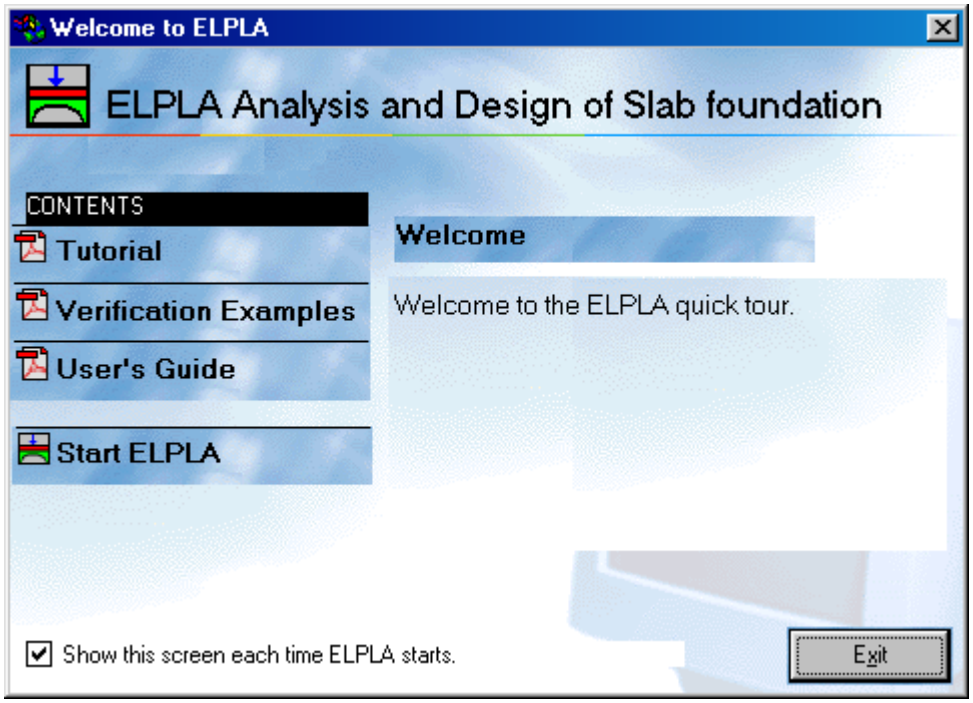

Figure B-2 "*ELPLA* Quick Tour" Program

1.4 Generating Circular Slab with Curved Element

A new template for generating second-order curved elements, Figure B-3, is now available for circular slab. As shown in Figure B-4, the new mesh refinement provides a better distribution of the results around the center of the circle, which reduces the local error in the elements around the center.

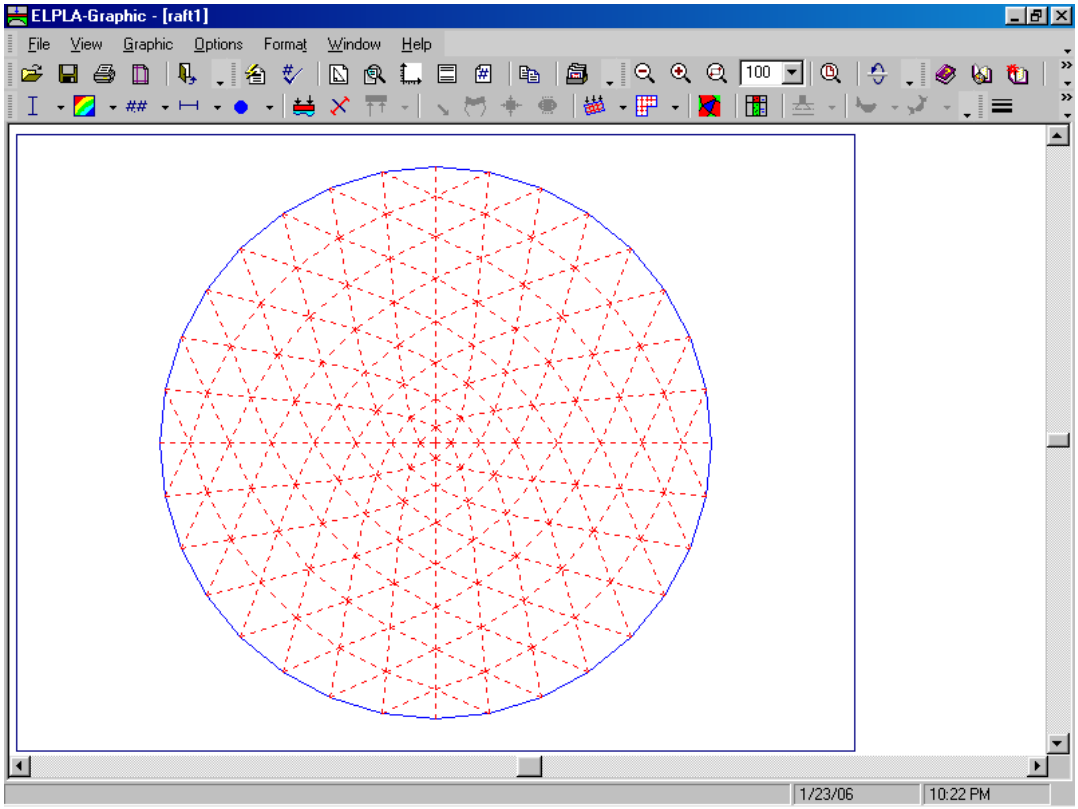

Figure B-3 Circular slab with curved elements

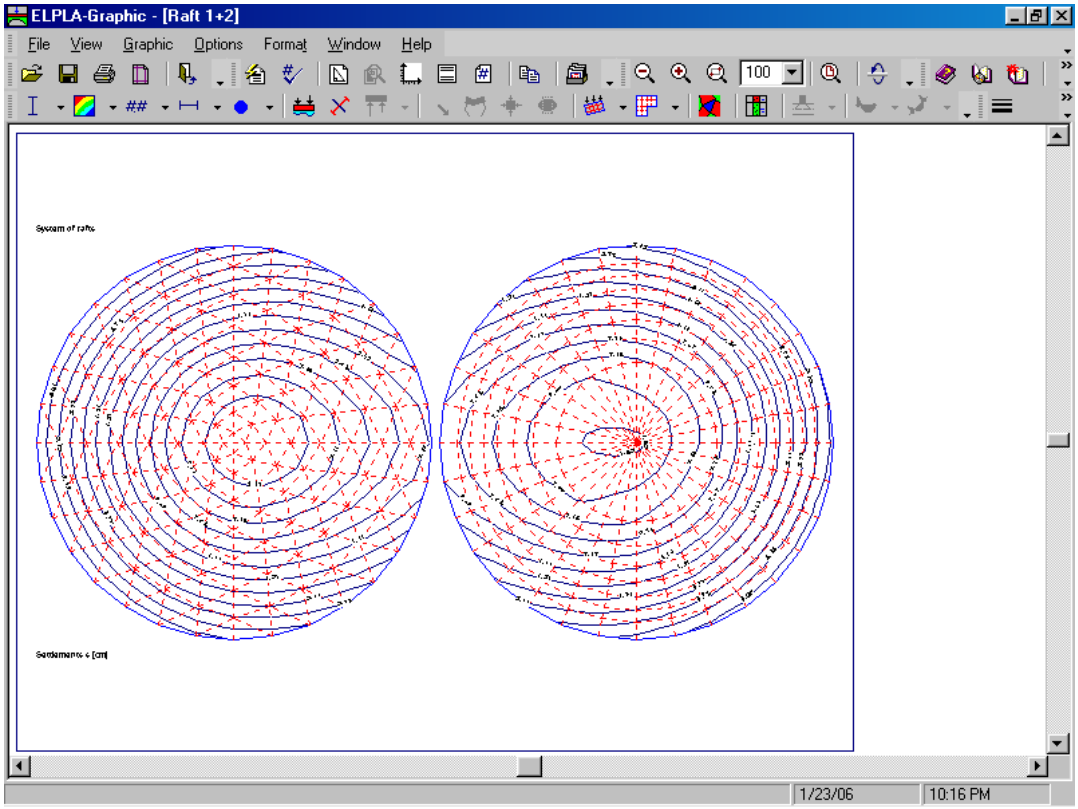

Figure B-4 Contour distribution for curved elements to the left and old elements to the right

1.5 Analysis of plane frame and plane stress

Besides the four different analyses available in the program *ELPLA* to analyze isolated raft, system of rafts, slab floors and grid, a new two analyses: Analysis of plane frame and plane stress are added (Figure B-5 and Figure B-6).

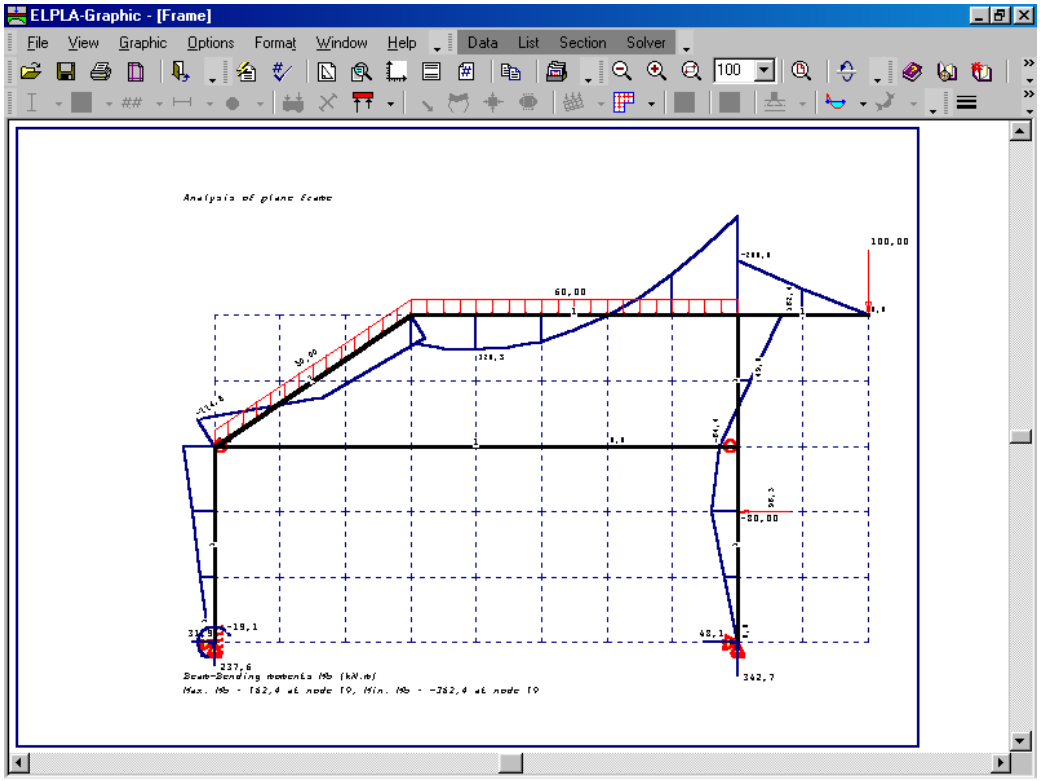

Figure B-5 Analysis of plane frame

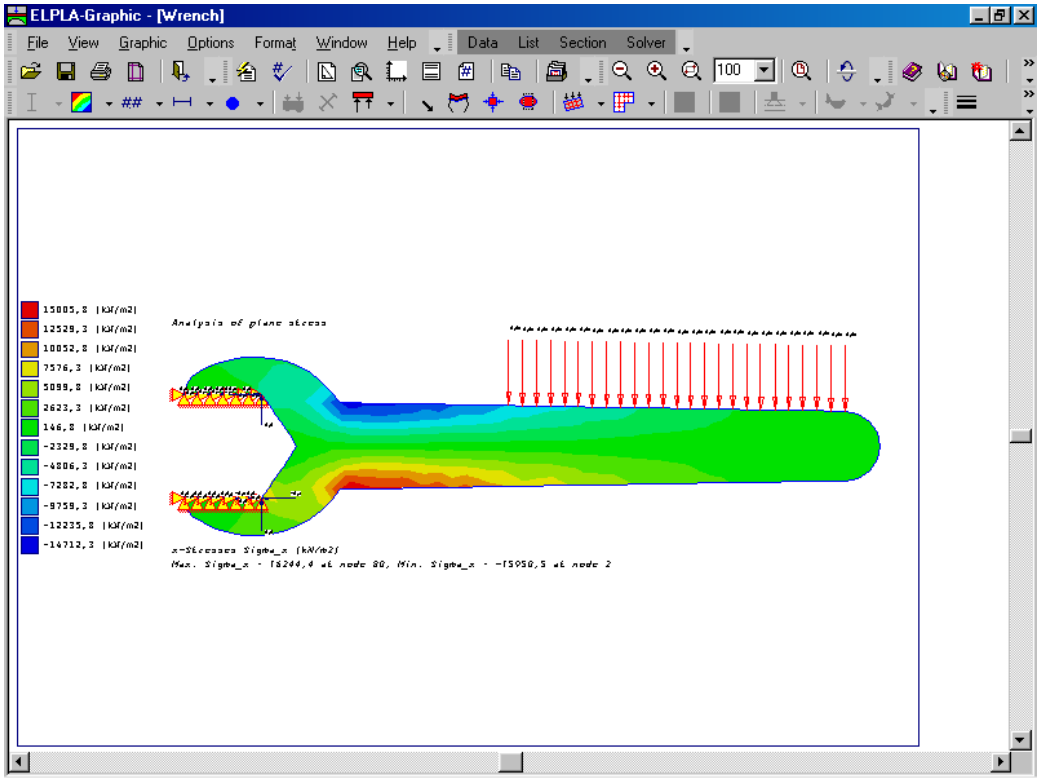

Figure B-6 Analysis of plane stress

2 Two-Dimensional Frame Problems

2.1 Introduction

The analysis of Two-Dimensional frame problems is now available in *ELPLA*. This section describes the frame modeling used for analysis this type of problems. It is recommended to read this section and to understand the procedures used by the program before starting to create any practical problem analysis.

2.2 Coordinate Systems

There are two different coordinates for Two-Dimensional frame problems; global coordinate system and local coordinate system (Figure B-7). Each of these coordinate systems is used to describe certain data such as the location of nodes or the direction of loads, displacements, internal forces and reactions. Understanding these different coordinate systems is essential for the user to define correctly the problem.

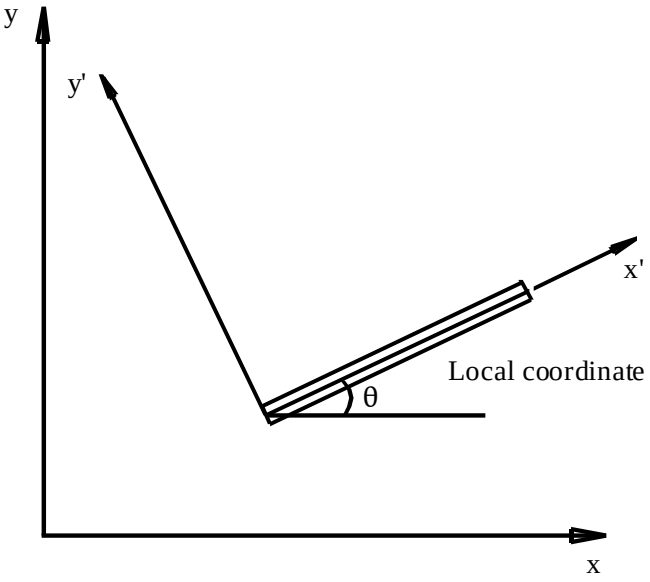

Figure B-7 System Coordinates

2.3 Element Loads

As shown in Figure B-8, *ELPLA* uses a different vertical direction for defining loads. The positive value of load means that it is a downward load. Nodal loads are applied on global coordinates while element loads are applied in three different cases as follow:

a. Self weight: A vertical uniform load distributed along the length of the element.
b. Snow load: A vertical uniform load distributed along the horizontal projection of the element.
c. Wind load: A uniform load distributed along the length of the element with a direction perpendicular to the element (local x` axis).

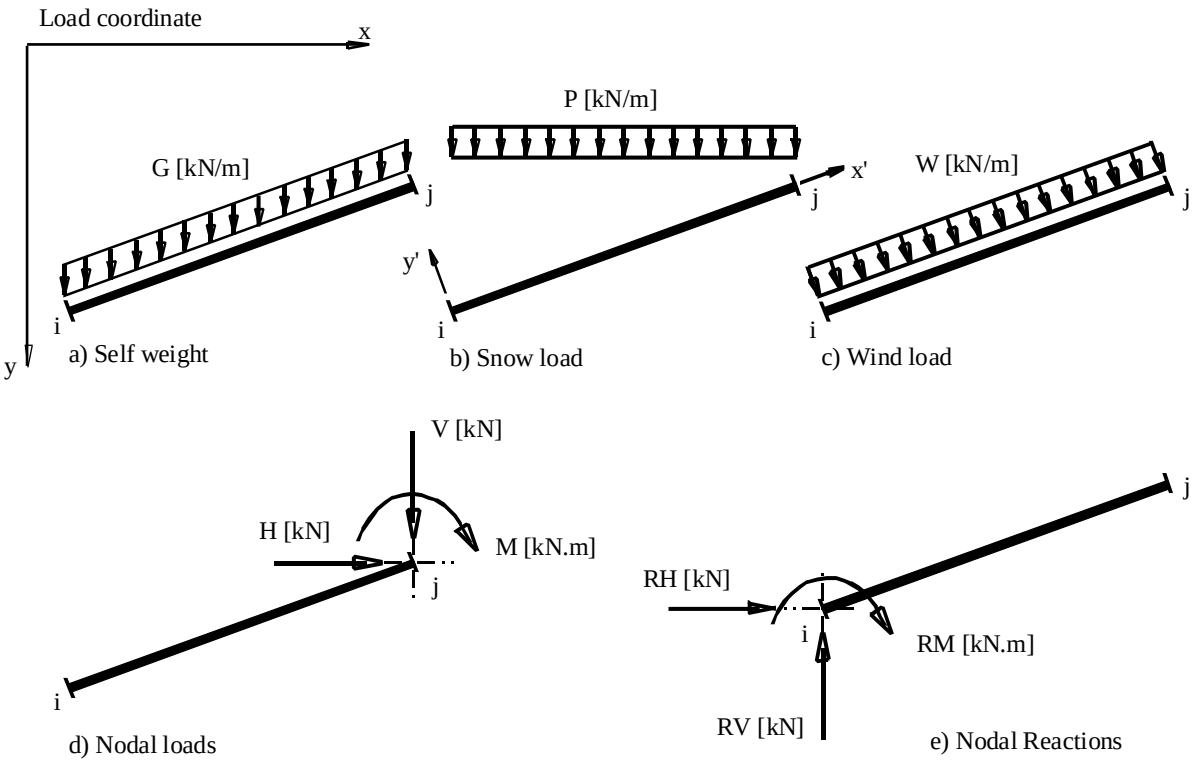

Figure B-8 Cases of element loads, nodal loads and nodal reactions with directions

2.4 Graphical output

The graphical output of results such as displacements, rotations and internal forces (bending moments, shear forces and normal forces) are drawn in locale coordinate.