

MONITOR THE SIMULATION OF MECHANICAL STRESSES BY COMPUTER

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Abstract: The aim of the paper is to develop interactive software for monitoring the technological process. Thus, the conceptual, theoretical and methodological framework in IT for generating new instruments, technologies for specific application in the area of technological process is created. Taking into account the state of the art of knowledge in this area, the following specific objectives are proposed in the paper: developing techniques and methods for data acquisition; designing programmers for a database containing the results obtained during the theoretical and experimental research; developing interactive programmers for monitoring the results obtained. The method can also be applied for monitoring of the mechanical stress nodal of aircrafts, rockets, ballistic missiles and gun barrels.

Keywords: sensor, transducer, software simulation, mechanical testing, mechanical stress.

1. INTRODUCTION. STATICAL ANALYSIS A TRACTION TEST

The Generative Structural analysis programming module of CATIA environment allows the simulation of the test pieces mechanical behavior. [1, 2, 3]

The sketch of the probe is shown in figure 1.

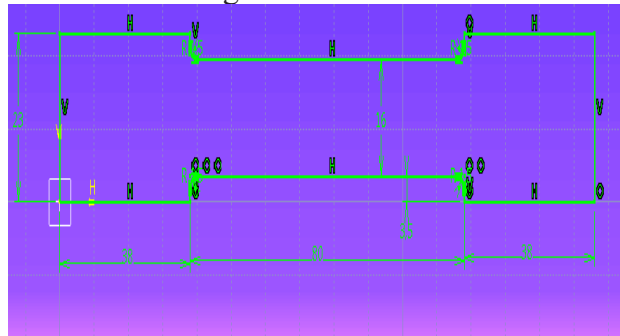


Fig.1 The sketch of the probe

The drawing of the test pieces model is shown in figure 2.

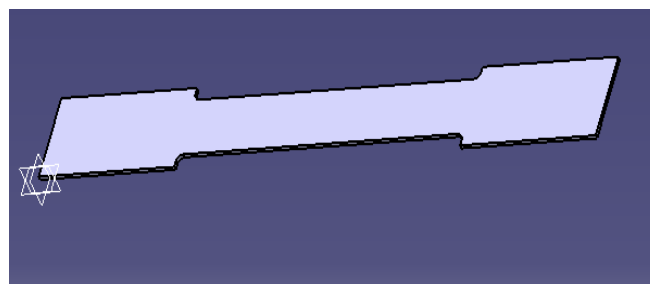


Fig. 2 Test pieces model

The displacement constraint and the distributed force of 7000 N is shown in figure 3 and 4.

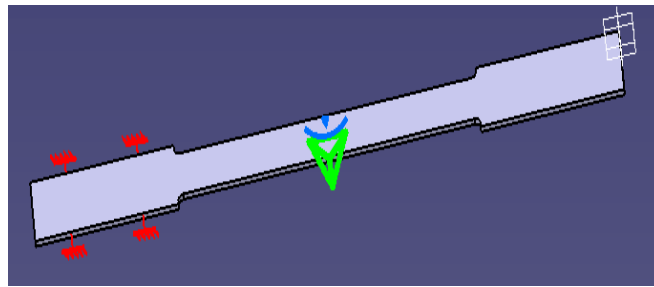


Fig.3 The displacement constraint

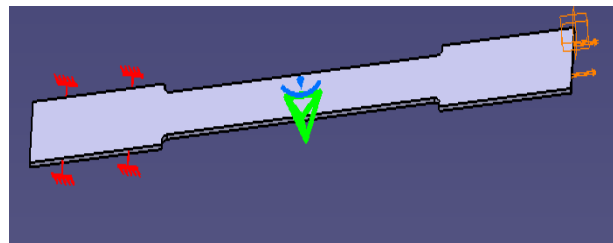


Fig.4 The distributed force

Solving the model and processing the results The calculation model is launched. Figure 5 shows the deformation of piece.

The stress von misses is shown in figure 6.

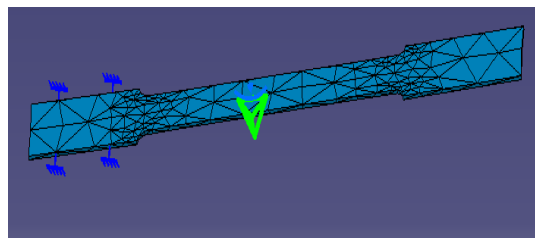


Fig. 5 The deformation of piece

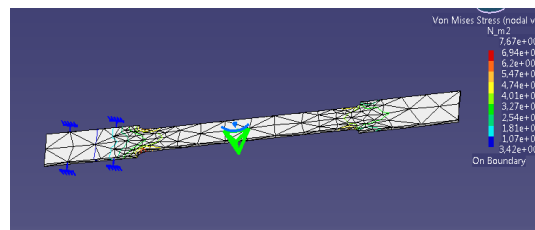


Fig. 6 Von Misses Stress

2.THE EQUIPMENT USED FOR THE EXPERIMENTAL RESEARCH STUDY

For testing the traction and determining the relative elongation, a traction device and a Wheanstone bridge are used and are shown in figure 7.[4,5,6,7,12]



Fig. 7 Device for the traction test

Some nodal values of mechanical stresses is shows in table 1.

Table 1 Von misses stress

X[mm]	Y[mm]	Z[mm]	Von misses stress[N/m ²]
43,1937	8.267	1	4.094e+008
52.87	6.71	1	4.34 e+008
58.98	11.59	1	4.36 e+008
52.52	11.44	1	4.33 e+008
68.88	10.94	1	4.37 e+008
78	11.5	1	4.36 e+008
87.29	11.48	1	4.37 e+008
95.78	11.54	1	4.35 e+008
108.51	11.32	1	4.14 e+008
111.96	11.48	1	3.80 e+008

3. MONITORING INTERACTIVE SOFTWARE OF MECHANICAL TESTING

Designing a software that stimulate the state of strength in the material under conditions of strength offers the possibility of creating a virtual laboratory able to make applications to different areas: medicine, constructions, aeronautics.

Estimated original elements

- new techniques of mechanical testings of advanced materials;
- modelling and simulating the behaviour of materials subjected to mechanical stress in traction and compression;
- designing interactive programmes using MySQL , PHP and HTML languages for a database; [8,9,10,11]
- designing interactive programmes for monitoring the obtained results.

3.1 Programme for creation of database

```
<html>
<head><title>Aplication base of data
</title></head><body>
<center>
<h1>creare tabel date</h1>
```

```
<?php>
$conn=mysql_connect(„localhost”,„joeuser”,„”);
mysql_select_db(„test”,$conn);
$sql=„create table ExportDataFile(id int not null primary key auto_increment, x varchar (75),
y varchar (75), z varchar (75), t varchar (75))”;
if (mysql_query($sql,$conn)){
echo „ data table created”;
} else {echo „something went wrong”;}
?> </center></body></html>
```

3.2 Creation of HTML form, introduction of data

```
<html>
<head><title>Inserare form
</title></head>
<body><center>
<h1>using buton</h1>
<FORM METHOD=POST ACTION=„insert.php”>
<p> adauga x:<br>
<INPUT TYPE=„text” Name=„textfield1” size=30><p> adauga y:<br>
<INPUT TYPE=„text” Name=„textfield2” size=30><p> adauga z:<br>
<INPUT TYPE=„text” Name=„textfield3” size=30><p> adauga tensiune:<br>
<INPUT TYPE=„text” Name=„textfield4” size=30><br><p><input type=submit
name=„submit” value=„insereaza date”></p>
</FORM></center></body></html>
```

3.3 PHP programme creation, taking data, inserting data in a MySQL database

```
<html>
<head><title>Aplicatie baze date
</title></head><body>
<center><h1>creare tabel date</h1>
<?php>
$conn=mysql_connect(„localhost”,„root”,„”);
mysql_select_db(„test”,$conn);
$sql=„insert into ExportDataFile (id,x,y,z,t) values(„’,’$_REQUEST[textfield1]’,
‘$_REQUEST[textfield2]’,’$_REQUEST[textfield3]’,’$_REQUEST[textfield4]’)”;
if (mysql_query($sql,$conn)){
echo “data inserted”;
} else
{echo “something went wrong”;}
?> </center></body></html>
```

3.4 Insert user’s nodal value programme

```
<html>
<head><title>Insert form
</title></head>
<body><center>
<h1>using buton</h1>
<FORM METHOD=POST ACTION=„vizualizare.php”>
```

```

<p> insert x:<br>
<INPUT TYPE="text" Name="textfield1" size=30><p> insert y:<br>
<INPUT TYPE="text" Name="textfield2" size=30><p> insert z:<br>
<INPUT TYPE="text" Name="textfield3" size=30><br><p><input type=submit
name="submit" value="data"></p>
</FORM></center></body></html>

```

3.5 PHP programme for visualising the values of stress

```

<html>
<head><title>Insertion form
</title></head><body><center>
<h1>using buton</h1>
<?php
$conn=mysql_connect(„localhost”,„root”,„");
mysql_select_db(„test”,$conn);
$sql="select * from ExportDataFile where (x=$_REQUEST[textfield1]) and
(y=$_REQUEST[textfield2]) and (z=$_REQUEST[textfield3])";
$result=mysql_query($sql,$conn) or die (mysql_error());
while ($newArray=mysql_fetch_array($result)){
$id=$newArray[„id”];
$x=$newArray[„x”];
$y=$newArray[„y”];
$z=$newArray[„z”];
$t=$newArray[„t”];
echo „pentru coordonatele x=$x;y=$y si z=$z rezulta efortul t=$t<br>”;
}??>
</center></body></html>

```

3.6 PHP programme for visualising the maximum values of stress

```

<html><head><title>maximum determination
</title></head><body><center>
<h1>using buton</h1>
<?php
$conn=mysql_connect(„localhost”,„root”,„");
mysql_select_db(„test”,$conn);
$sql=select MAX(t) as maxim from ExportDataFile;
$result=mysqlquery($sql,$conn) or die (mysql_error());
// maximum viewing
while($row=mysql_fetch_array($result)){
echo „maximum value is”,$row[„maxim”];
}??</center></body></html>

```

CONCLUSIONS

This method permits the geometrical modeling of a test probe, the application of various materials stored in the library of the programmer, the modifications of these materials, making constraints and force application. The test results are graphically visualized. In this way, the user can simulate the behavior of different materials subjected to tensile test. Then, the specific deformation of the test pieces is calculated, the pulling force and the corresponding unitary stress.

Designing a software that stimulate the state of strength in the material under conditions of strength offers the possibility of creating a virtual laboratory able to make applications to different areas: medicine, constructions, aeronautics.

Creating interactive programmers for monitoring the results obtained after the analysis with finite elements on any platform working with the Internet Explorer browser ensure the requirements of compatibility in order to integrate Romania in the European economic environment.

These programmers will develop the conceptual, theoretical and methodological framework of computerized technologies. They will generate new instruments, technologies and networks for specific applications. These programmed will be part of computerized systems that can be used in the educational field and they represent instruction-assisted technologies.

The paper designing interactive programmes using MySQL, PHP and HTML languages for a database; [8,9,10,11]

The paper present interactive programmes for monitoring the obtained results.

The method can also be applied for determining and monitoring of the mechanical stress nodal of aircrafts, rockets, ballistic missiles and gun barrels.

The method is a modern one and allows the simulation and monitoring of the tensile test of the materials used in the future for research focused on the study of the resistance structure (fuselage, wing, helicopter blade) component of airplanes, helicopters and missiles.

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