ANALYSIS DESCRIPTION command

Synopsis

The ANALYSIS TYPE command is used to specify the type of analysis to be performed.

Syntax

The following syntax is associated with the ANALYSIS TYPE command:

```
ANAlysis TYPe [ FLOW_MECHANICAL | FLOW_MECHANICAL_THERMAL \\
               | MEChanical | MECHANICAL_THERmal ]
```

Explanatory Notes

- Specification of the MECHANICAL keyword indicates that a standard (uncoupled) quasi-static mechanical analysis is to be performed. This is the default setting.

- To model saturated conditions where fluid flow occurs (or where a potential for fluid flow exists such as under ideal undrained conditions) in conjunction with (and coupled to) mechanical deformations, the keyword FLOW_MECHANICAL is specified.

- When this is the case, the mass density of the soil, specified using the MATERIAL SOLID command, represents the dry mass density. Since the stresses printed in the output are effective, the pore fluid pressure must be added to them in order to obtain total stresses.

- To model unsaturated conditions where the pore pressure is assumed to be zero and pore fluid is assumed not to flow, the ANALYSIS TYPE must be set to MECHANICAL. In this case the soil density must include the mass (or weight) of any water present in a partially saturated soil.

- Conditions where part of the soil mass is unsaturated and part is saturated can be modeled by specifying the FLOW_MECHANICAL keyword, along with a very small value of combined bulk modulus (see the MATERIAL FLUID or MATERIAL SOLID commands) for the unsaturated portions of the soil.

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\[1\] If the acceleration of gravity, specified using the GRAVITY ACCELERATION VALUE command, is taken equal to unity, then the soil density represents the unit weight of the soil.
• If a quasi-static, semi-coupled thermoelastic analysis is to be performed, the keyword MECHANICAL_THERMAL should be specified.

• Finally, if an analysis is to be performed in which mechanical deformations, flow of pore fluid, and thermal effects are coupled together, the keyword FLOW_MECHANICAL_THERMAL should be specified.

• Specification of the MECHANICAL or MECHANICAL_THERMAL command transforms APES into a non-linear analysis program in which the continuum is assumed to consist of a single phase; i.e., the solid. As such, APES can (without loss of efficiency) be used to analyze non-geologic continua, or geologic media where the flow of pore fluid is assumed to be of negligible importance. In the latter case, the material density must include the mass (or weight) of any water present in the soil.
Example of Command Usage

To specify a semi-coupled thermoelastic analysis, enter either of the following commands:

```
analysis type mechanical_thermal
 ana typ sca mechanical_the
```