Operator **DEFI_LIST_FREQ**

1 Goal

To create a list of realities while possibly refining around values of frequencies informed by the user.

Product a structure of data of the type `listr8`. 

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2 Syntax

\[ \text{Lr} \quad \text{[listr8]} = \text{DEFI\_LIST\_FREQ} \]

\[ ( \quad \star / \text{VALE=} \quad \text{lr8} , \quad [l_{R}] \]

\[ \quad / \quad \star / \text{DEBUT=} \quad \text{debu} , \quad [R] \]

\[ \quad \star / \text{INTERVALLE=} \quad (_{F} ( \quad \star \quad / \text{JUSQU\_A=} \quad \text{r1} , [R] \]

\[ \quad \star / \text{NUMBER=} \quad \text{n1} , [I] \]

\[ \quad \star / \text{NOT=} \quad \text{r2} , [R] \]

\[ ), ), \]

\[ \quad \star \quad \text{RAFFINEMENT=} \quad (_{F} ( \]

\[ \quad \star / \text{LIST\_RAFFINE=} \quad \text{lr8} , \quad [L_{R}] \]

\[ \quad \star / \text{NB\_POINTS=} \quad / \quad \text{5} , \quad [\text{DEFECT}] \]

\[ \quad / \quad \text{Pt} , \quad [I] \]

\[ \quad \star / \text{PAS\_MINI=} \quad / \quad 0.001 , \quad [\text{DEFECT}] \]

\[ \quad / \quad \text{not} , \quad [R] \]

\[ \quad \star / \text{CRITERION=} \quad / \quad \text{‘RELATIVE’} , \quad [\text{DEFECT}] \]

\[ \quad / \quad \text{‘ABSOLUTE’} , \]

\[ \quad / \quad \text{‘LARGEUR\_3DB’}, \]

\[ \text{# Keyword only associated with the criteria ‘RELATIVE’ and ‘ABSOLUTE’:} \]

\[ \quad \star / \text{DISPERSION=} \quad / \quad 0.01 , \quad [\text{DEFECT}] \]

\[ \quad / \quad \text{disp} , \quad [R] \]

\[ \text{# Keyword only associated with the criterion ‘LARGEUR\_3DB’:} \]

\[ \quad \star / \text{AMOR\_REDUIT=} \quad \text{lr8\_amor} , [l_{R}] \]

\[ \quad / \quad \text{LIST\_AMOR} = \quad \text{l\_amor} , \quad [\text{listr8}] \]

\[ \quad \star \quad \text{INFORMATION=} \quad / \quad 1 \quad , \quad [\text{DEFECT}] \]

\[ \quad / \quad 2 \quad , \]

\[ \quad \star \quad \text{TITLE=} \quad \text{title} , \quad [l_{Kn}] \]

\)
3 Operands

3.1 Operand VALE

\[ VALE = lr8 \]

List of “basic” realities which will automatically be part of the structure of data `lstr8` result. This list can be built starting from a list Python.

3.2 Operand BEGINNING

\[ \text{BEGINNING} = \text{debu} \]

The first reality of the list of “basic” realities which one wants to build.

3.3 Operand INTERVAL

\[ \text{INTERVAL} = \]

\[ \text{JUSQU}_A = r1 \]

End of the interval which one will cut out with a constant step.

\[ / \text{NUMBER} = n1 \]

Many steps which one wants in the interval which ends in \( r1 \).

\[ / \text{NOT} = r2 \]

Pas de division interval.

Notice:

All the values required in the basic list are automatically in the final list at exit of `DEFI_LIST_FREQ`. When the keyword is used NOT it may be that the number of calculated step is not rigorously whole. One “will then adapt” the last interval to fall down exactly on the end value (\( \text{JUSQU}_A \)).

3.4 Keyword REFINEMENT

3.4.1 Operand LIST_RAFFINE

\[ \text{LIST_RAFFINE} = lr8 \]

List of the frequencies around which one wishes to refine. This list can be built starting from a list Python.

This keyword is particularly interesting in the case of a harmonic analysis of a structure (operator `DYNA_VIBRA` [U4.53.03]), because it will make it possible to calculate the harmonic answer around the Eigen frequencies of the structure and thus to recover the local extrema of them. It is possible to directly recover the Eigen frequencies in a structure of data of the type `MODE_XXX` exit of a modal calculation carried out for example with the order `CALC_Modes`. It is enough for that to use the function `LIST_VARI_ACCES()`.

It is pointed out that it is then essential to carry out the code in mode `PAR_LOT=' NON'` (keyword of the order `BEGINNING` or `CONTINUATION`). For more details to see documentation [U1.03.02]).

Example:

\[ \text{MODES}=\text{CALC_Modes} \ (\text{MATR_RIGI}=\text{MATASSR}, \]
\[ \text{MATR_MASS}=\text{MATASSM}, \]

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OPTION = 'ADJUSTS',
CALC_FREQ=F (FREQ=(5., 10., 15., 20.,
24., 27.))
)

list_freq = MODES.LISTE_VARI_ACCES () ['FREQ']

list_freq is thus a list python containing the list of the Eigen frequencies present in
the result MODES.

### 3.4.2 Operand \texttt{PAS\_MINI}

\begin{itemize}
\item PAS\_MINI = / 0.001 , [R]
\item not , [R]
\end{itemize}

If the difference between two values is lower than \texttt{PAS\_MINI} then one of them is removed.

**Exception**: if the two values concerned belong one to the list given under \texttt{LIST\_RAFFINE} and
the other with the basic list, then they are kept both.

### 3.4.3 Operand \texttt{DISPERSION}

\begin{itemize}
\item DISPERSION = / 0.01 , [DEFECT]
\item disp , [R]
\end{itemize}

\texttt{DISPERSION} is the width of the interval surrounding each frequency of \texttt{LIST\_RAFFINE} where
one wants to refine.

### 3.4.4 Operand \texttt{CRITERION}

\begin{itemize}
\item CRITERION = / 'RELATIVE' , [DEFECT]
\item 'ABSOLUTE',
\item 'LARGEUR\_3DB',
\end{itemize}

If \texttt{CRITERION} = 'RELATIVE' or 'ABSOLUTE':

\begin{itemize}
\item DISPERSION = / 0.01 , [DEFECT]
\item disp , [R]
\end{itemize}

The width of the interval \texttt{df} surrounding each frequency \texttt{freq} of \texttt{LIST\_RAFFINE}
where one wants to refine is worth:

- If \texttt{CRITERE=' RELATIF'}:
  \[ df = \text{disp} \cdot \text{freq} \]
- If \texttt{CRITERE=' ABSOLU'}:
  \[ df = \text{disp} \]

If \texttt{CRITERE=' LARGEUR\_3DB'}:

\begin{itemize}
\item AMOR\_REDUIT = lr8\_amor
\end{itemize}

List of reduced depreciation (\[ \eta_1, \eta_2, \ldots, \eta_n \] expressed as a percentage)
corresponding to each clean mode of the system in the form of list of realities.

\begin{itemize}
\item LIST\_AMOR = l\_amor
\end{itemize}
Name of the concept of the type list<!sub>8<!sub> containing the list of reduced depreciation 
(<!sub>η<!sub>1,<!sub> η<!sub>2, . . . ,<!sub> η<!sub>n<!sub> expressed as a percentage).

Notice :
If the number of reduced depreciation given is lower than the number of basic
vectors used in the modal base, depreciation of the additional vectors is taken equal
to the last damping of the list.

If damping <!sub>η<!sub>i is nonnull, the frequency <!sub>freq<!sub>i used to calculate Llength of the interval
has<!sub> df<!sub> is the frequency <!sub>freq<!sub>i of LIST_RAFFINE shifted at the frequency of resonance
of a forced system:<!sub> freq<!sub>i = freq<!sub>i √(1−2η<!sub>i^2) .
The length of the interval<!sub> df<!sub> surrounding each frequency <!sub>freq<!sub>i where one wants to refine
is worth:
• If <!sub>η<!sub>i ≠ 0 :
  df = 2η<!sub>i<!sub>freq<!sub>i
• If <!sub>η<!sub>i = 0 :
  df = 0.01freq<!sub>i

3.4.5 Operand NB_POINTS

◊ NB_POINTS = / 5 , / Pt , [DEFECT]
[1]

NB_POINTS is the number of points which one wants to add around the frequencies of the list
LIST_RAFFINE.
The added points are uniformly distributed in the interval <!sub>df<!sub> . Thus if NB_POINTS is an odd
number the frequencies of LIST_RAFFINE will be in the final list.
If CRITERE='LARGEUR_3DB' and NB_POINTS is an even number, the frequency is kept
<!sub>freq<!sub>i of LIST_RAFFINE and the frequency of resonance is added of a forced system such as:
freq<!sub>i = freq<!sub>i √(1−2η<!sub>i^2) .

3.5 Operand INFORMATION

◊ INFORMATION = I

Indicate the level of impression of the results of the operator.
1: no impression,
2: impression of the list of realities created

3.6 Operand TITLE

◊ TITLE = title

Title which the user wants to give to his list of realities.
4 Examples

The cas-test sld21b presents an example of use of `DEFI_LIST_FREQ`.

**Example 1:**

Let us imagine that one wants to create the basic list:

1. 3. 5. 10. 15.

who is such as the step is:

2. of 1. with 5.

5. of 5. with 15.

And that one wants to refine around frequency 3.5 with the criterion 'ABSOLUTE'.

One can write:

```plaintext
Lr = DEFI_LIST_FREQ
    (BEGINNING = 1.,
     INTERVAL = (_F (JUSQU_A= 5., NOMBRE= 2, ),
                 _F (JUSQU_A= 15., PAS= 5, ),),
     REFINEMENT= (_F (LIST_RAFFINE= 3.5,
                    PAS_MINI= 0.001,
                    NB_POINTS= 5,
                    CRITERE=' ABSOLU',
                    DISPERSION=0.02,)),
    )
```

A list then is obtained `listr8` containing the values:

```
[1. , 3. , 3.49, 3.495, 3.5, 3.505, 3.51, 5. , 10. , 15. ]
```

**Example 2:**

By using the criterion 'RELATIVE' for refinement one can write :

```plaintext
Lr = DEFI_LIST_FREQ
    (VALE = [1. , 3. , 5. , 10. , 15. ],
     REFINEMENT = (_F (LIST_RAFFINE= 3.5,
                    PAS_MINI= 0.001,
                    NB_POINTS= 6,
                    CRITERE=' RELATIF',
                    DISPERSION=0.03,)),
    )
```

A list then is obtained `listr8` containing the values:

```
```