ZZZZ344 – Validation of the computation of the angular deviations in Summarized

DEFI_CABLE_BP:

The computation angular deviations in operator DEFI_CABLE_BP is made by means of interpolations by spline cubic. However it happens sometimes that this method fails when the mesh is too irregular. In this case one uses a method without interpolation for computation of the angular deviations.

The purpose of this test is to validate the computation of the angular deviations by this method. For that, one compares for the same geometry, the computation of the angular deviations by spline and without interpolation. The meshes for which the interpolation by spline fails result from various meshes of the Vercors enclosure. The mesh for which it is correct was created from the equation of the circle to be possible nearest other meshes.

1 Problem of reference

1.1 Geometry and meshes

One considers a horizontal cable and circular contents in concrete. The mesh of the part concrete is the same one for each modelization. But the mesh of the cable changes.

Modelization a: the cable was built from the equation of the circle; it comprises 100 meshes type SEG2. It is very regular, the interpolation by spline is correct. This modelization is used as reference for the two others.

Modelization b: the cable (as the concrete) is resulting from a mesh of the Vercors enclosure. The discretization of the cable is identical to the modelization A (100 meshes).

Modelization C: the cable (as the concrete) is resulting from a finer mesh of the enclosure Vercors, it comprises 302 meshes.

2 Reference solution

Modelization A.

3 Modélisation A

3.1 Characteristic of the network

The mesh of the cable is generated from the equation of the circle. It comprises 100 meshes.

3.2 Quantities tested and results

One tests the value of the cumulated angular deviation of the last node of the cable.

Node	NOM_PARA	Value of reference	Tolerance	Reference
N1229	ALPHA	6.461066164316	1.E-6	NON_REGRESSION

4 Modelization B

4.1 Characteristic of the mesh

The mesh of the cable is resulting from a mesh of the Vercors enclosure. It comprises 100 meshes.

4.2 Quantities tested and results

One tests the value of the cumulated angular deviation of the last node of the cable.

Node	NOM_PARA	Value of reference	Tolerance	Reference
N1328	ALPHA	6.461066164316	1.2E-2	AUTRE_ASTER

Note: without the transition with the method without interpolation, the error is of 5%.

5 Modelization C

5.1 Characteristic of the mesh

The mesh of the cable is resulting from a finer mesh of the Vercors enclosure. It comprises 302 meshes.

5.2 Quantities tested and results

One tests the value of the cumulated angular deviation of the last node of the cable.

Node	NOM_PARA	Value of reference	Tolerance	Reference
N1531	ALPHA	6.461066164316	2.0E-2	AUTRE_ASTER

Note: without the transition with the method without interpolation, the error is of 80%.

6 Summary of the results

One notes that on a sufficiently regular geometry, the results of the method without interpolation are very close to those obtained with the method of interpolation by spline cubic. Moreover, as indicated in remark, the swing towards this method makes it possible well to correct the errors related to the failure of the interpolation by spline when the mesh is very irregular.