# Serafin格式说明

Serafin格式是EDF开发的一种大数据存储格式，类似于NetCDF格式。

Serafin格式文件包括一组网格数据（节点和三角形单元，目前不支持四边形网格）和多组时刻的数据。可用于存储2D和3D的telemac模型计算结果文件和地形文件。

二进制格式的Serafin文件内容如下（为方便理解，还是用英语）：

* A record containing the title of the study (72 characters) and a 8 characters string indicating the type of format (SERAFIN or SERAFIND)
* A record containing the two integers NBV(1) and NBV(2) (number of linear and quadratic variables, NBV(2) with the value of 0 for Telemac, as quadratic values are not saved so far),
* NBV(1) records containing the names and units of each variable (over 32 characters),
* A record containing the integers table IPARAM (10 integers, of which only the 6 are currently being used),
  + if IPARAM (3) ≠ 0: the value corresponds to the x-coordinate of the origin of the mesh,
  + if IPARAM (4) ≠ 0: the value corresponds to the y-coordinate of the origin of the mesh,
  + if IPARAM (7) ≠ 0: the value corresponds to the number of planes on the vertical (3D computation),
  + if IPARAM (8) ≠ 0: the value corresponds to the number of boundary points (in parallel),
  + if IPARAM (9) ≠ 0: the value corresponds to the number of interface points (in parallel),
  + if IPARAM (8) or IPARAM(9) ≠ 0: the array IPOBO below is replaced by the array KNOLG (total initial number of points). All the other numbers are local to the sub-domain, including IKLE.
  + if IPARAM (10) = 1: a record containing the computation starting date,
* A record containing the integers NELEM,NPOIN,NDP,1 (number of elements, number of points, number of points per element and the value 1),
* A record containing table IKLE (integer array of dimension (NDP,NELEM) which is the connectivity table. N.B.: in TELEMAC-2D, the dimensions of this array are (NELEM,NDP)),
* A record containing table IPOBO (integer array of dimension NPOIN); the value of one element is 0 for an internal point, and gives the numbering of boundary points for the others,
* A record containing table X (real array of dimension NPOIN containing the abscissae of the points),
* A record containing table Y (real array of dimension NPOIN containing the ordinates of the points),

接着，再保存下一时刻的数值，首先保存时间值

* A record containing time T (real),
* NBV(1)+NBV(2) records containing the results tables for each variable at time T.

# Serafin格式文件读取及可视化

可读取Serafin格式文件的软件很多，包括：

* Blue Kenue
* Tecplot
* MATLAB
* PyTelTools
* QGIS\_UHM\_SerafinReader\_v2.0
* pputils

有一个Fortran的程序，将Serafin二进制格式转换为ASCII格式，方便于理解Serafin格式内容。