OpenTURNS release highlights

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UserDay #14, 21 June 2021, online event

Overview

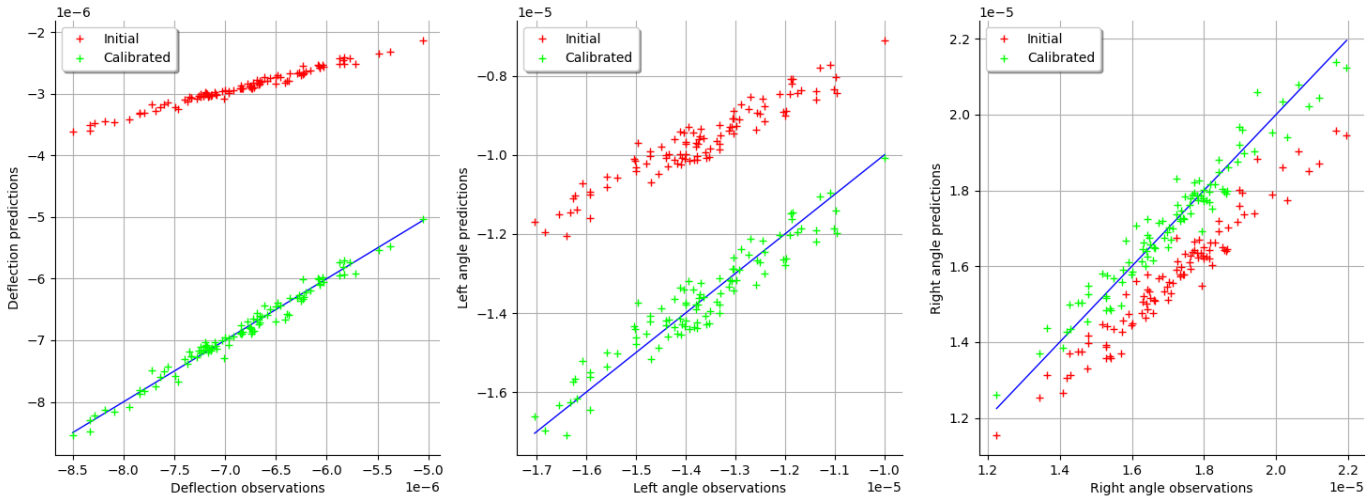
New features since last year in releases:

- v1.16: fall 2020
- v1.17: spring 2021

Contents

Grid graphs

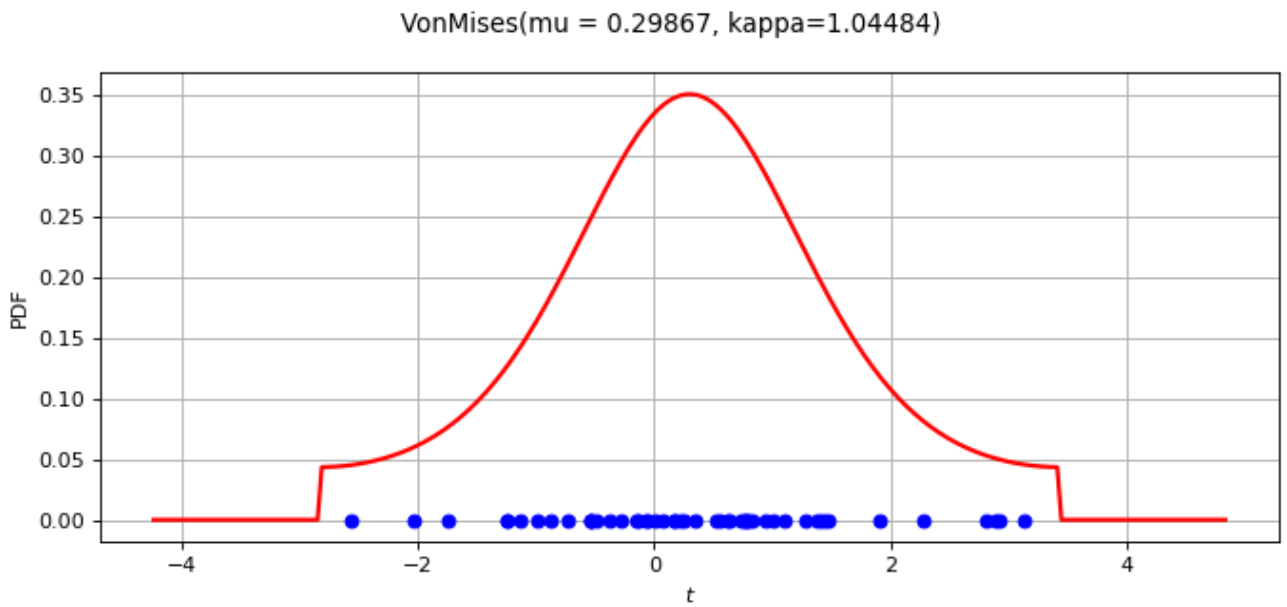
```
graph = ot.GridLayout(d, d)
for i in range(d):
    for j in range(d):
        pdf = dist.getMarginal([i, j]).drawPDF()
        graph.setGraph(i, j, pdf)
```



Von Mises distribution estimation

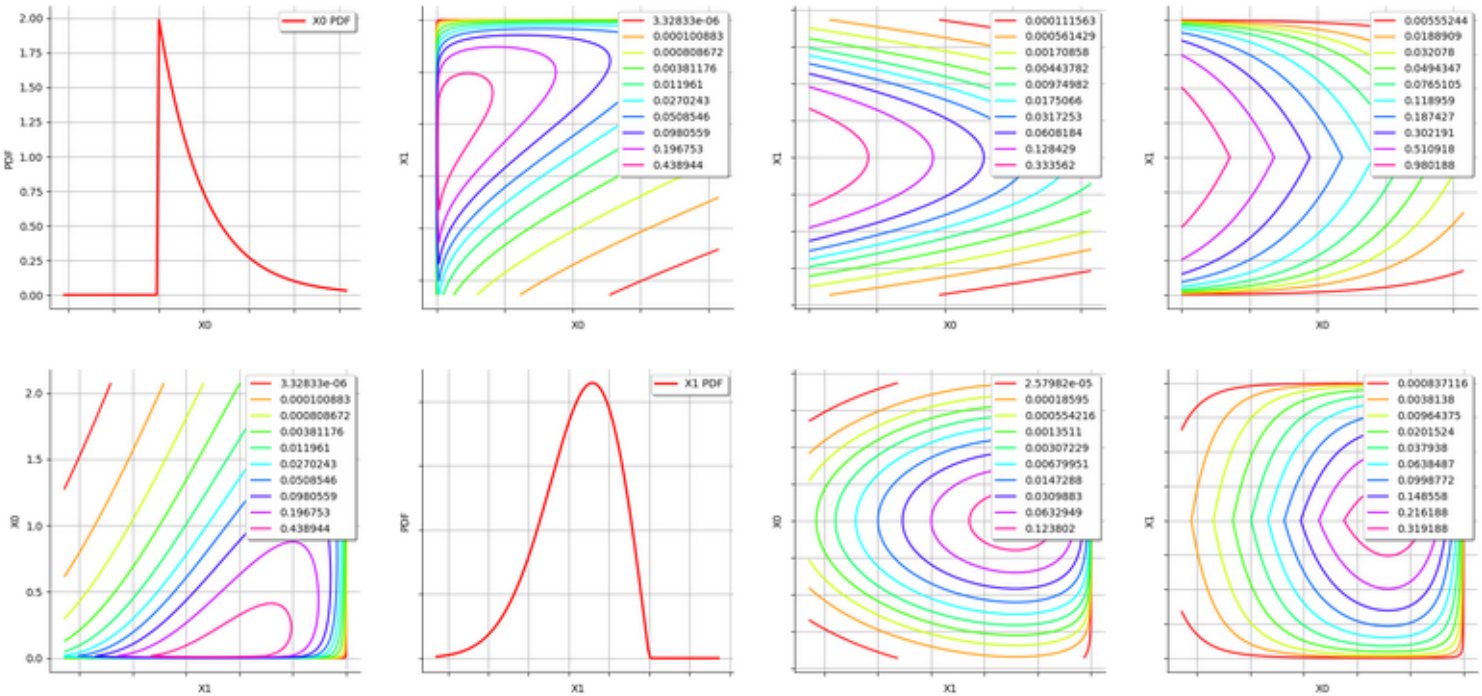
$$\hat{\mu}_n = \mathrm{Arg}(z_n)$$

$$\hat{\kappa}_n \quad \text{s.t.} \quad \frac{I_1(\hat{\kappa}_n)}{I_0(\hat{\kappa}_n)} = \sqrt{\frac{n}{n-1}\left(|z_n|^2 - \frac{1}{n}\right)}$$



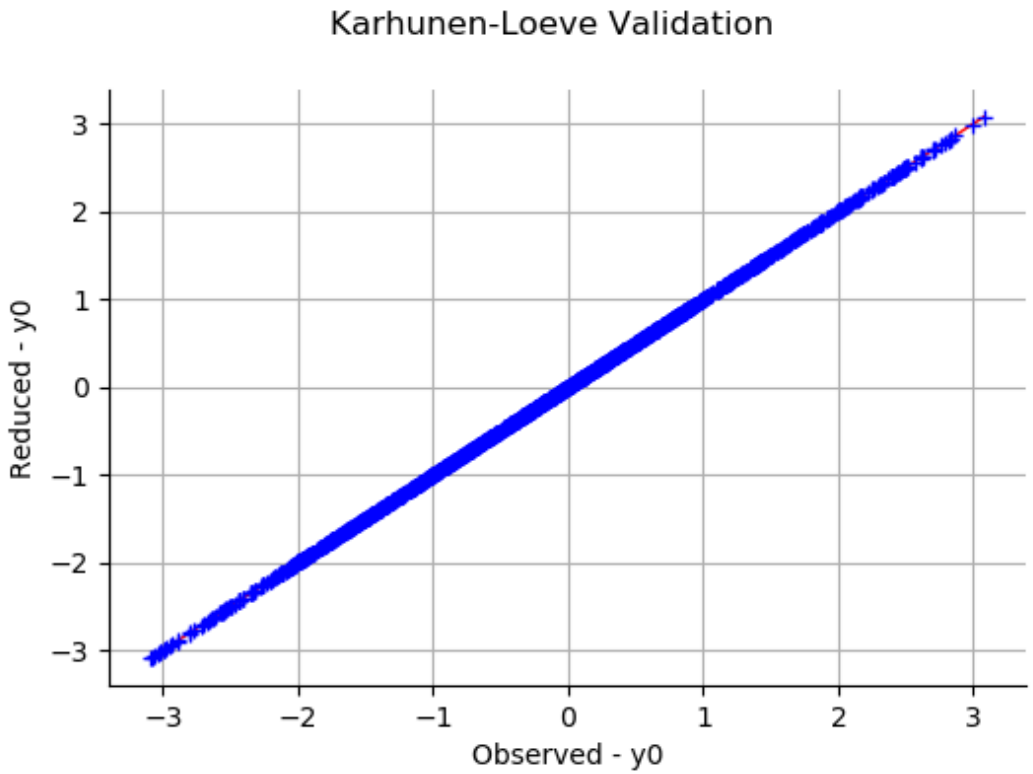
Block independent distribution

```
c1 = ot.NormalCopula(R)
atom1 = ot.ComposedDistribution([ot.Exponential(2.0), ot.WeibullMax(2.0, 2.0)], c1)
c2 = ot.ClaytonCopula(3.0)
atom2 = ot.ComposedDistribution([ot.Normal(2.0, 1.0), ot.Triangular(2.0, 3.0, 4.0)], c2)
distribution = ot.BlockIndependentDistribution([atom1, atom2])
```



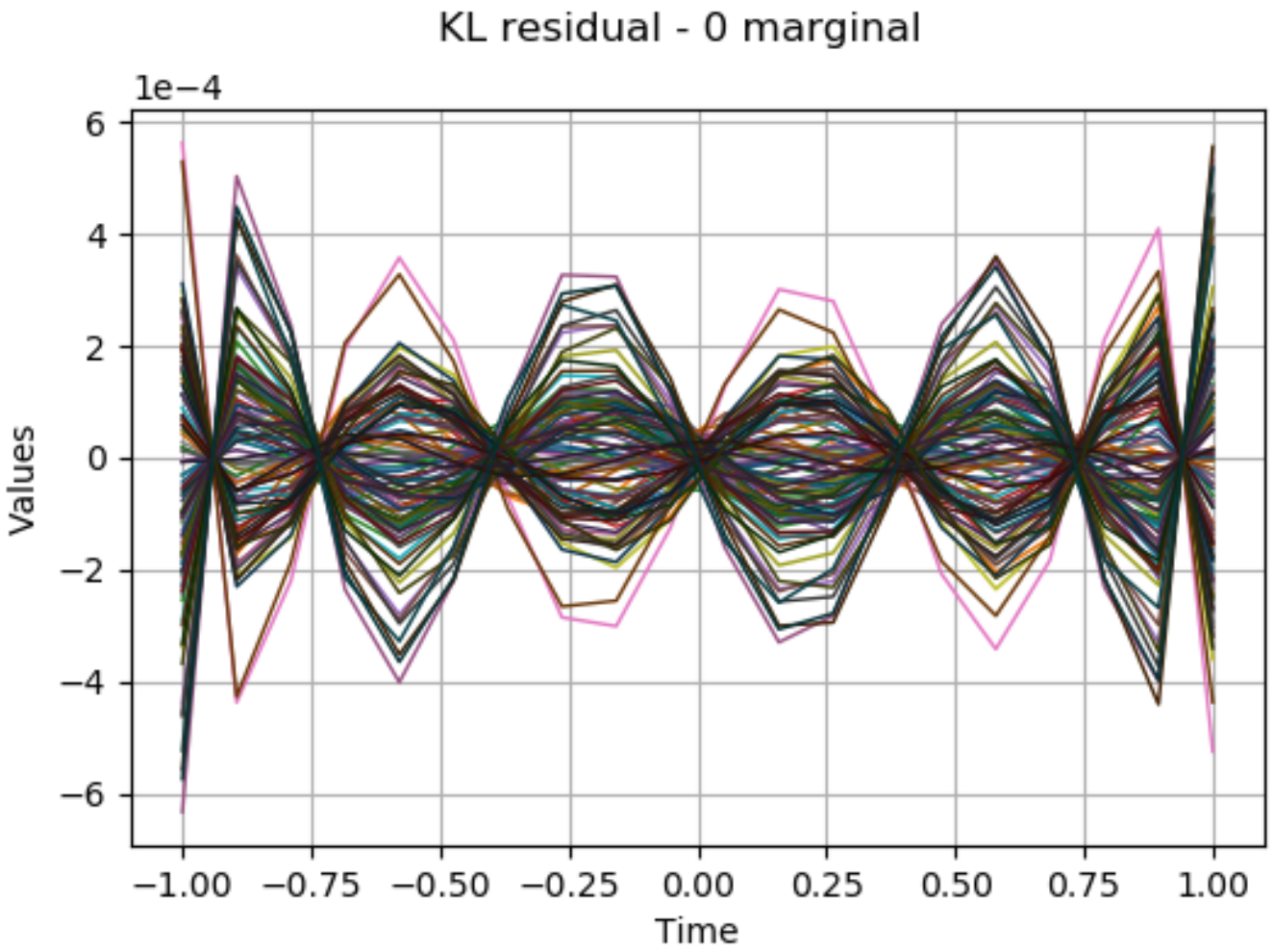
Karhunen-Loeve validation: qqplot

```
algo = ot.KarhunenLoeveSVDAlgorithm(processSample, threshold)
algo.run()
klresult = algo.getResult()
validation = ot.KarhunenLoeveValidation(processSample, klresult)
validation.drawValidation()
```



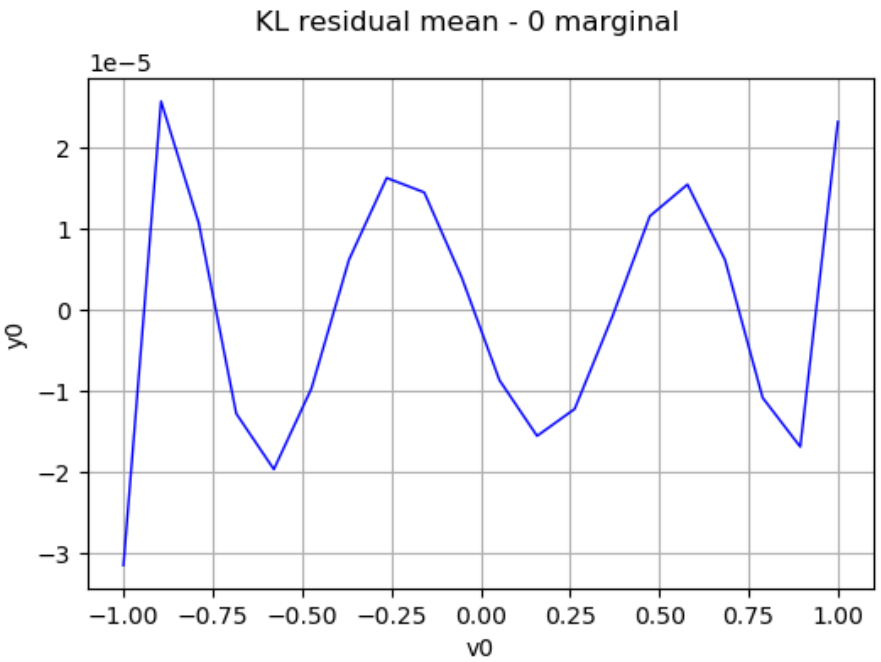
Karhunen-Loeve validation: residual

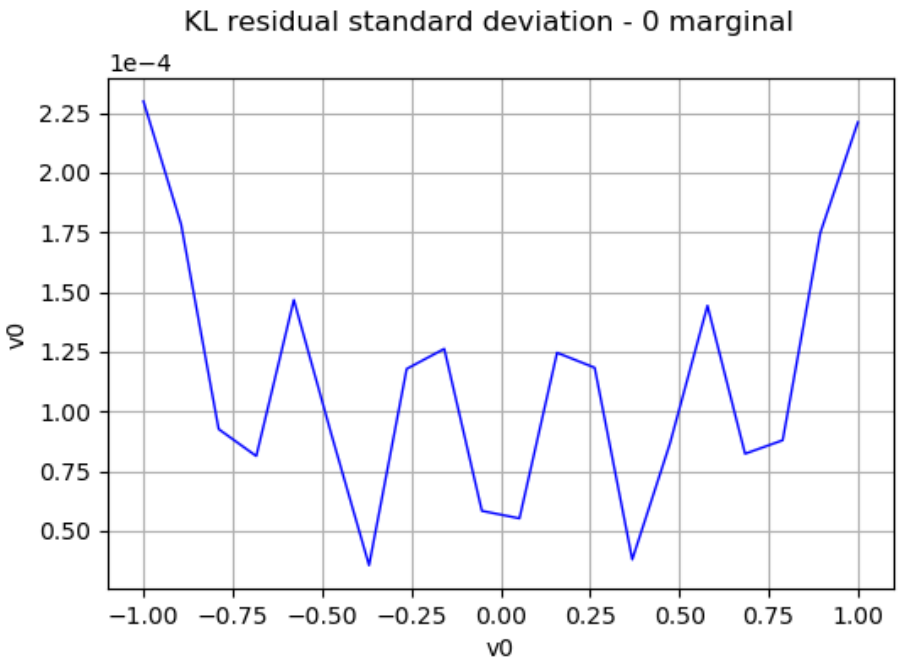
```
validation.computeResidual().drawMarginal(0)
```



Karhunen-Loeve validation: residual mean/stddev

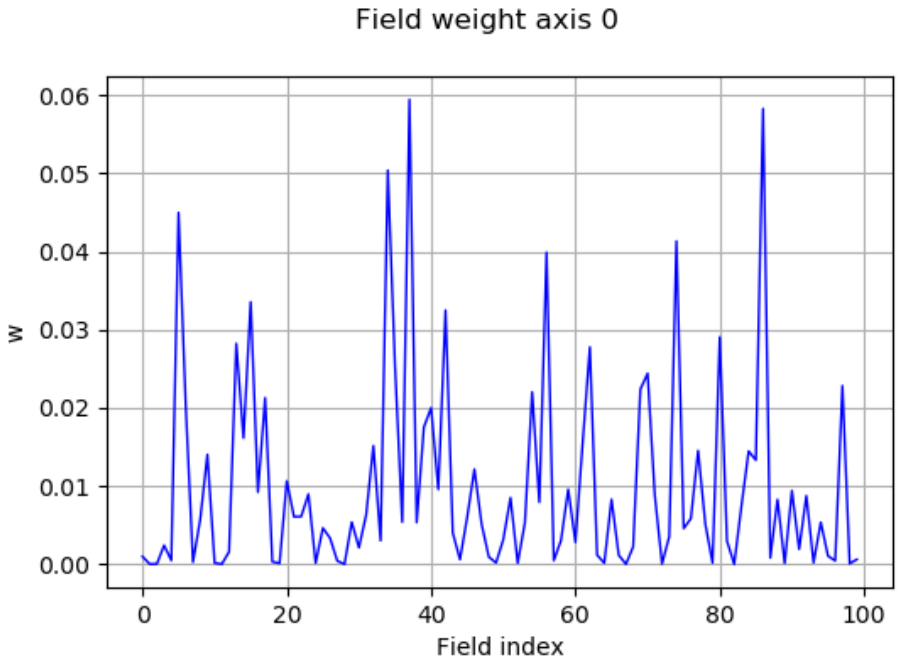
```
validation.computeResidualMean().drawMarginal(0)
validation.computeResidualStandardDeviation().drawMarginal(0)
```

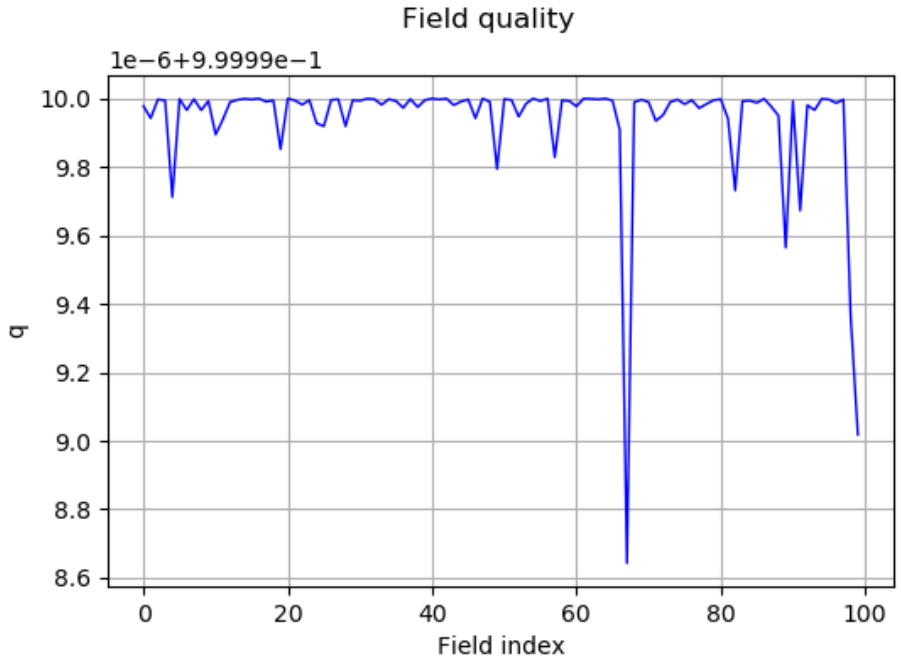




Karhunen-Loeve validation: weight/quality of obs

```
validation.drawObservationWeight(0)
validation.drawObservationQuality()
```



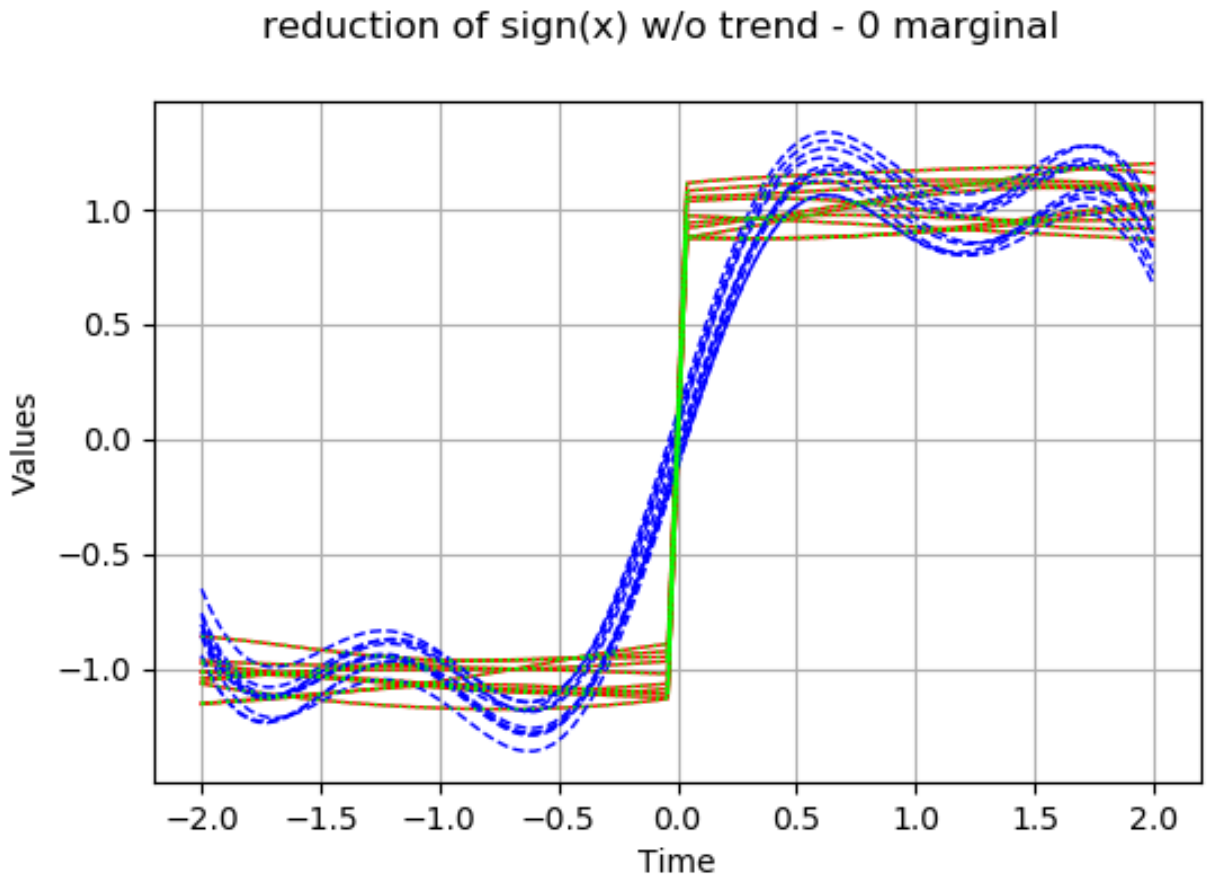


$$v_k^i = \frac{(\xi_k^{(i)})^2}{\sum_{i=1}^{N}(\xi_k^{(i)})^2}$$

$$q^i = \frac{\left\| \tilde{X}^i(t) \right\|^2}{\left\| X^i(t) \right\|^2}$$

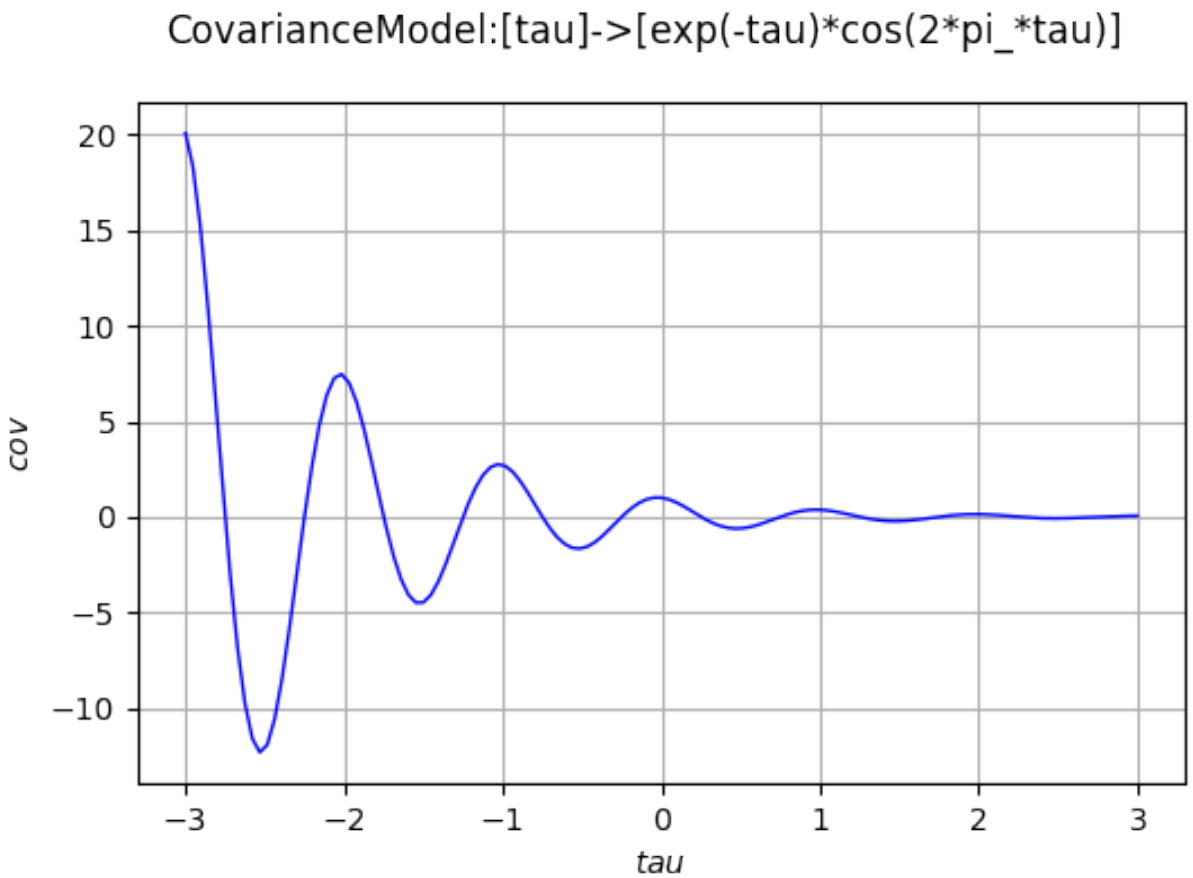
Karhunen-Loeve reduction

```
reduced1 = ot.KarhunenLoeveReduction(result)(sample)
reduced2 = ot.KarhunenLoeveReduction(result, trend)(sample)
```



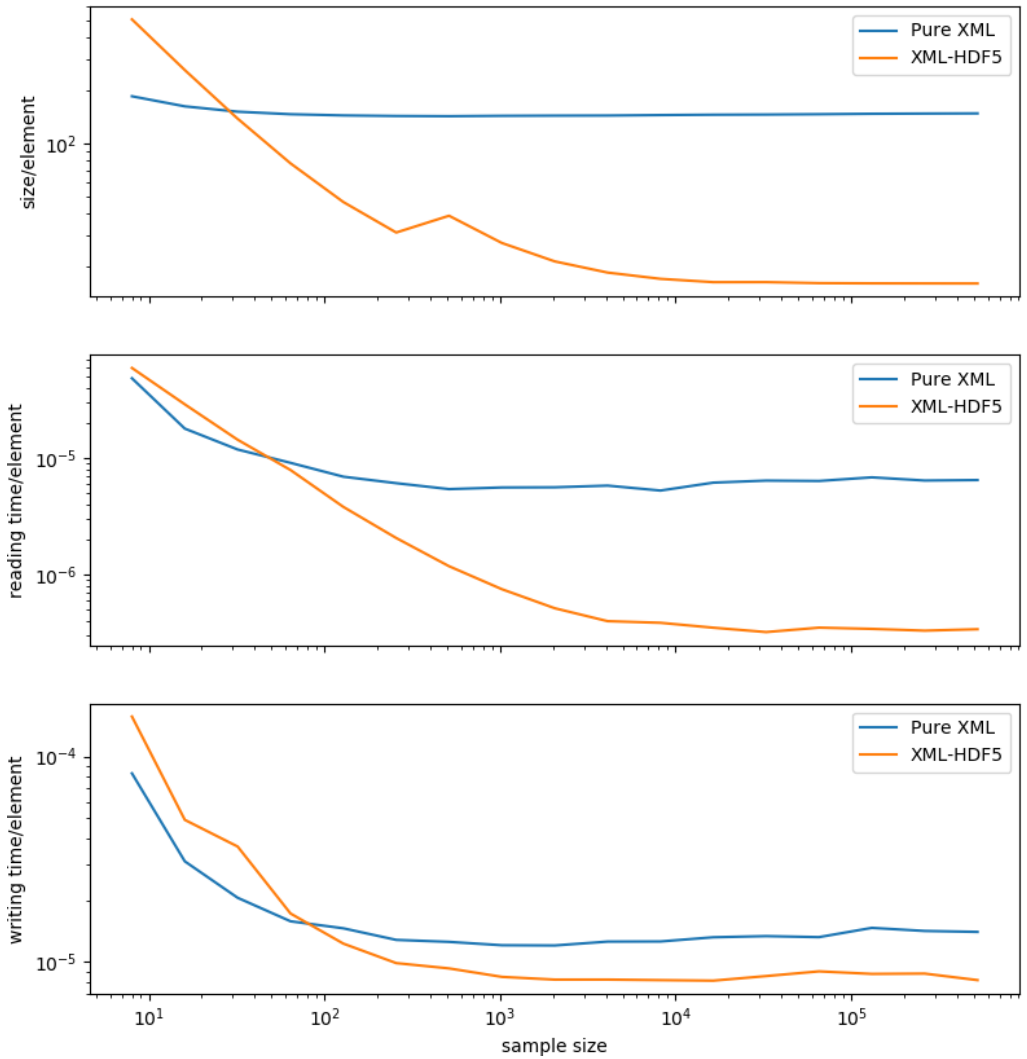
Covariance models

- IsotropicCovarianceModel
- KroneckerCovarianceModel
- StationaryFunctionalCovarianceModel



XML/H5 storage backend

```
study = ot.Study()
study.setStorageManager(ot.XMLH5StorageManager('study.xml'))
study.save() # study.xml + study.h5
```



Various classes

- FejerAlgorithm: intégrate cyclic functions
- MinimumVolumeClassifier: classify according to a density
- KFoldSplitter/LeaveOneOutSplitter: split sample in training/validation parts
- VertexValuePointToFieldFunction: define a filed function from a vectorial one

Other improvements

- New discourse forum (rip users@openturns.org)
- New Python wheels for some compiled modules (otmorris, ...)
- Experimental weekly Python binaries of the development version
- More and more bugfixes

END

Thank you for your attention!
Any questions?