

## Using NAG Library routines in LabVIEW – examples

This archive contains example virtual instruments (VIs) which illustrate some aspects of utilizing NAG numerical routines and methods within the LabVIEW programming environment. Some background information on how to incorporate NAG routines into LabVIEW is available at

- <http://blog.nag.com/2011/07/using-nag-net-methods-in-labview.html>
- <http://blog.nag.com/2011/10/calling-routines-from-nag-fortran-and-c.html>

These examples use the NAG Fortran Library, the NAG C Library and the NAG Library for .NET, and have been built under Windows 7 using LabVIEW Version 11.0 (32 bit). Before running any of these examples, the user must have (a) this version of LabVIEW and (b) the relevant NAG Library [see below] installed on their machine.

More specifically, the examples use:

- NAG Fortran Library [Mark 23] for Win32 Applications, Windows XP/Vista/7 DLL, Intel Visual Fortran (*FLDLL234M*)
- NAG C Library [Mark 9] for Microsoft Windows XP/Vista/7, Intel C/C++ or Microsoft C/C++ (*CLW3209DAL*)
- NAG Library for .NET [Release 1] for Windows XP/Vista/7, x86-32, x86-64 (*DTW3101DAL*)

It should be noted that the .NET examples use the 32 bit assembly (NagLibrary32.dll) rather than the 64 bit one (which is also part of the NAG Library for .NET installation on 64 bit systems).

### NAG Library for .NET examples

c09cc.vi – computes the one-dimensional multi-level discrete wavelet transform.

e01ba.vi – determines a cubic spline interpolant to a given set of data.

e04uf.vi – minimizes an arbitrary smooth function subject to constraints (including bounds on the variables, linear constraints and smooth nonlinear constraints) using a sequential programming method.

f06bn.vi – computes the square root of  $a^2 + b^2$ , where  $a$  and  $b$  are its arguments.

g01aa.vi – calculates the mean, standard deviation, coefficients of skewness and kurtosis, and the maximum and minimum values for a set of ungrouped data. Weighting may be used.

## NAG C Library examples

`c06ekc.vi` – calculates<sup>1</sup> the circular convolution or correlation of two real vectors.

`c09cac.vi` – computes<sup>2</sup> the one-dimensional discrete wavelet transform at a single level.

`e04nfc.vi` – solves<sup>3</sup> general quadratic programming problems.

`f01ecc.vi` – computes<sup>4</sup> the matrix exponential of a real square matrix.

`f07adc.vi` – computes<sup>5</sup> the *LU* factorization of a real matrix.

`f07aec.vi` – solves<sup>6</sup> a real system of linear equations with multiple right-hand sides, where the matrix of coefficients has been factorized by `f07adc`.

`f07agc.vi` – estimates<sup>7</sup> the condition of a real matrix *A*, where *A* has been factorized by `f07adc`.

`g01aac.vi` – calculates<sup>8</sup> the mean, standard deviation, coefficients of skewness and kurtosis, and the maximum and minimum values for a set of ungrouped data. Weighting may be used.

## NAG Fortran Library examples

`f01blf.vi` – calculates<sup>9</sup> the rank and pseudo-inverse of a real matrix.

`f03aaf.vi` – calculates<sup>10</sup> the determinant of a real matrix.

`f06eaf.vi` – calculates<sup>11</sup> the dot product of two real vectors.

`f06raf.vi` – calculates<sup>12</sup> one of various norms, or the maximum absolute value of the elements of a real matrix.

`g01aaf.vi` – calculates<sup>13</sup> the mean, standard deviation, coefficients of skewness and kurtosis, and the maximum and minimum values for a set of ungrouped data. Weighting may be used.

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<sup>1</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/C06/c06ekc.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/C06/c06ekc.pdf)

<sup>2</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/C09/c09cac.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/C09/c09cac.pdf)

<sup>3</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/E04/e04nfc.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/E04/e04nfc.pdf)

<sup>4</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/F01/f01ecc.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/F01/f01ecc.pdf)

<sup>5</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/F07/f07adc.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/F07/f07adc.pdf)

<sup>6</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/F07/f07aec.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/F07/f07aec.pdf)

<sup>7</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/F07/f07agc.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/F07/f07agc.pdf)

<sup>8</sup> [http://www.nag.co.uk/numeric/CL/nagdoc\\_cl09/pdf/G01/g01aac.pdf](http://www.nag.co.uk/numeric/CL/nagdoc_cl09/pdf/G01/g01aac.pdf)

<sup>9</sup> [http://www.nag.co.uk/numeric/fl/nagdoc\\_fl23/pdf/F01/f01blf.pdf](http://www.nag.co.uk/numeric/fl/nagdoc_fl23/pdf/F01/f01blf.pdf)

<sup>10</sup> [http://www.nag.co.uk/numeric/fl/nagdoc\\_fl23/pdf/F03/f03aaf.pdf](http://www.nag.co.uk/numeric/fl/nagdoc_fl23/pdf/F03/f03aaf.pdf)

<sup>11</sup> [http://www.nag.co.uk/numeric/fl/nagdoc\\_fl23/pdf/F06/f06eaf.pdf](http://www.nag.co.uk/numeric/fl/nagdoc_fl23/pdf/F06/f06eaf.pdf)

<sup>12</sup> [http://www.nag.co.uk/numeric/fl/nagdoc\\_fl23/pdf/F06/f06raf.pdf](http://www.nag.co.uk/numeric/fl/nagdoc_fl23/pdf/F06/f06raf.pdf)

<sup>13</sup> [http://www.nag.co.uk/numeric/fl/nagdoc\\_fl23/pdf/G01/g01aaf.pdf](http://www.nag.co.uk/numeric/fl/nagdoc_fl23/pdf/G01/g01aaf.pdf)

## **Support and feedback**

It should be noted that, although this collection of examples has been built and run on the platform mentioned above, it is not a NAG product. However, we are keen to receive user feedback, and will respond to technical queries and problem reports via [support@nag.co.uk](mailto:support@nag.co.uk) with the aim of further refining this collection and making it still more useful to the LabVIEW community.

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