

# Release Notes



CDH/VAO Software  
Version 4.0r9

October 2007



All the features described in these Release Notes are supported for Linux and Windows XP platforms.

### Matlab Version:

- CDH/VAO Version 4.0 requires Matlab Version 7.4.0 (R2007a) Service Pack 2

### Operating System:

- Recommended Operating System and Graphic board:

Operating System:	Red Hat Linux 4 or higher versions Microsoft Windows XP 32 or XP64
Graphics board:	Nvidia
glVersion:	1.4.0 NVIDIA 43.63 or higher
QtVersion:	3.1 or higher

### Installation:

- CDH/VAO Version 4.0 uses following environment variables to locate the software, license data and server:

HOME	: user's home directory
HOST	: hostname of computer running CDH/VAO
DISPLAY	: variable for display
VAO_LICENSE	: path of vao floating license file
VAO_HOME	: installation path of vao program
VAO_SERVER	: hostname of server running vao license daemon

VAO\_NUTECH : (optional environment variable for using NuTech Optimizer), installation path of NuTech Optimizer program, a product of NuTech Solutions GmbH

- m-file vao\_defaults.m:

Go to \$VAO\_HOME/mat, link 'vao\_defaults.m' to 'vao\_defaults.m-nastran' for users who use Nastran to calculate the modal data base of the original finite element model as well as the correction matrices for Submodel Shell-Elements.

File 'vao\_defaults.m-cdhvao' is for users who use Permas to generate VAO modal data base. In this case, the internal calculation of correction matrices is activated.

## Network License Server:

- CDH/VAO Version 4.0 uses a network license server to manage VAO License. To obtain a VAO floating license file the user must supply CDH with hostname and CPU-ID of the machine on which the license server is to run.

## VAO Utilities:

- delivery database (DDB) is supported for generation of CDH/VAO data using the MSC or NX Nastran
- UGVX for converting OP2-file to CDH/VAO input-files

## New Features in the VAO release Version 4.0:

- CDAMP Element as Submodel

The CDAMP elements can be defined as Submodel, displayed and animated in the Vaoviewer. The most used relationships between the design parameters and the element property parameters are 'Relative Damping' and 'Absolute Damping'.

Relative Damping:  $E_B = O_B * (1 + D_{RB})$

Absolute Damping:  $E_B = D_B$

The interactive definition of CDAMP-Submodel can be performed in Menu: <VAO Main Menu> /<Submodel>/<Submodel Definition>/<Dampers>

For the batch generation of CDAMP-Submodel the user can use following definition example as input format (BEGIN-END block):

```
BEGIN cdamp-251

    SM_name = 'Cdamp_251'

    SM_var = 'D_RB_251'

    SM_type = 'damper'

    SM_calc = 'E_B=O_B*(1+D_RB_251);'

    SM_elemstr = '251';

END
```

- Load Input Data through the control file

The control file contains the location of the output from the UGVX program (modal database, coupling-matrix, CSTM, loads), structure and fluid model plus additional settings such as damping and target lines. The control file provides an easy way to load the model definition.

A simple example of control file which includes three lines:

OP2FILE ='SOL111.op2'; %: To specify the modal data

SBDDFILE ='struc.dat'; %: Structure Model

FBDDFILE ='fluid.dat'; %: Fluid Model

- Block Method for NAI calculation

'Memory for Transformations' is used as block-size in the Block Method for NAI calculation.

- Variations of Transient Analysis

With this new feature user can perform transient analysis with Submodels. The Variations of Submodel are specified by user defined m-file which provides flexible method to set the values of design variables. The results of transient analysis are saved in matlab-file with mat-format.

Following menus are available for Variations of Transient Analysis:

- Menu: <VAO Main Menu>/<Full Models>/<Uncoupled Operation>/<Transient Response>
  - <Newmark-Method>/<Variations>/<m-File Input>: newmark method for uncoupled system
  - <ODE-Method>/<Variations>/<m-File Input>: ODE method for uncoupled system
- Menu: <VAO Main Menu>/<Full Models>/<Coupled Operation>/<Transient Response>
  - <Newmark-Method>/<Variations>/<m-File Input>: newmark method for coupled system
  - <ODE-Method>/<Variations>/<m-File Input>: ODE method for coupled system

- Variation of Frequency Response Analysis with m-file Input

In the menu <VAO Main Menu>/<Variations>/<File Input>/<m-file Input> user can use a m-file to set the values of design variables and specify a directory for saving output files.

The menus in previous version

- <VAO Main Menu>/<Variations>/<File Input>/<Create Template> and
- <VAO Main Menu>/<Variations>/<File Input>/<Calculate Variations>

are now moved to

- <VAO Main Menu>/<Variations>/<File Input>/<Template Input>/<Create Template> and
- <VAO Main Menu>/<Variations>/<File Input>/<Template Input>/<Calculate Variations>

- Optimisation Beta Multi-Load (ML) Method

The Beta-ML method has been added to CDH/VAO to formulate the optimization problem with multiple load cases.

The target lines can be defined graphically after computing the response of initial design or they may be defined in an ASCII file which is referenced from the control file with the TGTFILE keyword.

A user-defined cost function (m-file) can be considered in optimisation process. The file name of cost function can be specified in Target File with keyword COST.

There are two steps in optimisation-process of Beta-ML-method.

Step 1: CDH/VAO will try to reduce the frequency responses to satisfy the selected Target. At the end of this process VAO checks if all constraints are satisfied (target lines lie above all frequency responses) and if cost function is specified, then VAO starts Step 2.

Step 2: CDH/VAO will try to reduce the cost function without violation of constraints.

Following sub-menus are available for Beta-ML Optimisation in menu <VAO Main Menu>/<Optimisation>/<Beta-ML-Method>:

- <Mode Selection>: to select mode index and to set adaptive mode reduction

- <Initialisation>: to select cost function, grids, dof and type of response
- <View Response/Target>: to view responses of initial design and target lines
- <Set/Reset Target>: to set/reset target lines
- <Optimisation Parameters>: to specify control parameter for optimizer
- <Constrained Optimisation>: to start the optimisation
- <Results Output>: to display and save the structure responses, fluid responses, and design parameters. The cost and mass results are written to the bottom of all saved output.

- Structure lama-table

The structure lama-mat-file will be selected directly without pre-selecting lama-out-file like in previous version.

- AMLS-modc-matrix

It is possible now to use modal coupling matrix which is calculated by AMLS for Panel Participation Calculations in VAO.

If the modal coupling matrix for Panel is available in \*\_coupl.asc.mat (an output file from UGVX), by clicking on the menu <Calculate Participation> and selecting fluid nodes a dialog box with question "Use PANEL-modc-matrix which was generated by AMLS?". User can select "Yes" for using AMLS PANEL-modc-matrix or "No" for modal modc-matrix generated by VAO.

- Interface to NuTech Optimizer

This interface enables VAO-users to use external optimizer (e.g. NuTech's ClearVu Engineering Global Optimizer) to perform optimisation, if the Optimizer NuTech.jar is available. The Optimizer NuTech.jar is a software product of Company NuTech Solutions GmbH. For installation of Optimizer NuTech.jar please contact NuTech Solutions GmbH support for assistance.

Following sub-menus are available for VAO-NuTech Interface in menu <VAO Main Menu>/<Optimisation>/<NuTech Optimizer>:

- <Mode Selection>: User can select specific modes and define parameter Adaptive Mode Reduction.

- <NUSOLVER Parameters>: User can set some parameters that control the behaviour of ClearVu Global Optimizer.
- <Initialisation>: Definition of objectives based on the Frequency Responses.
- <Optimisation>: To start the optimisation process.

Results of optimisation can be saved on pre-selected directory.

- Performance improvement in Vaoviewer

There are some speed optimizations and visual improvements. There are also two new options in the option menu.

- <monochrome mode>: a performance optimized rendering mode with one color.
- <draw all solids mode>: to draw all existent solid elements. This reduces drawing performance.