

# GUIDE: how to include paper contributions

One of the final aims of *YetAnotherFEcode* is to offer a platform for reproducible scientific research. This guide synthetically shows how to add codes used in your journal papers, *following the guiding principle to keep the code as modular and general as possible*. In the following, let us distinguish between:

- **General purpose code:** all the code that can reasonably be used in different projects, even though (possibly) developed along with a paper contribution (example: a new element type). This kind of code should be included in yaFEc with regular commits and pull requests.
- **Paper-specific code:** all the functions that are used in a specific publication. It may include newly developed formulations to tackle specific problems (see the DpROM example, next). This kind of code should be kept separate from the rest of the code, and it's the object of this guide.

## The “papers” folder

In this folder, you can create your subfolder, to be named with a short TAG. Here all your *paper-specific code* must be included, along with (if available) examples, references and notes. Do NOT include papers and/or data files.

Diagram illustrating the folder structure and content for a paper contribution:

- The **papers** folder contains:
  - DpROM** folder (name your paper folder with a short TAG)
    - wrapper** folder
    - DpROM.jl** (your paper's code)
    - DpromAssembly.m**
    - example.mlx** (references and additional notes)
    - References.pdf**
  - how to contribute.pdf**
- The **src** folder contains:
  - .gitignore**
  - .gitmodules**
  - README.md**
  - startup.m**

Example LiveScript code (example.mlx):

```
EXAMPLE: 2D beam, with an arc-shaped defect.
This example loosely retrace the one reported in Section 7 (Numerical Test - I) of the paper:
Marconii, J., Tiso, P., Quadrelli, D. E., & Braghin, F. (2021). A higher-order parametric nonlinear reduced-order model for imperfect structures using Neumann expansion. Nonlinear Dynamics.
https://doi.org/10.1007/s11071-021-06496-y

1 clear;
2 close all;
3 clc
4 format short g

set analysis parameters:

5 FORMULATION = 'N1'; % N1/N1t/N0
6 VOLUME = 1; % integration over defected (1) or nominal volume (0)
7

411 plot(w_linear, abs(fr_linear(forced_dof, :))/Ly, 'k--', ...
412 'DisplayName','Linear-d')
413 end
414 legend
```

Plot: y-FR (beam mid-span) vs  $\omega$  [rad/s]. The plot shows the response of the beam mid-span for different models: ROM-n (blue line), ROM-d (orange line), DpROM-N1v (yellow line), and Linear-d (black dashed line). The x-axis ranges from 350 to 700 rad/s, and the y-axis ranges from 0.2 to 1.0.

*In this paper example, a parametric ROM is developed for shape defects that uses an ad-hoc formulation.*

(optional) LiveScript example, with comments, references and results

## Code in “src”

In some cases, some paper-specific functions and methods must be included in the **src** folder to work with previously existing classes. To do so, add these methods as separate functions in the class folders (“@classname”) with the naming convention: “[paper tag]\_[method name].m”. For clarity, also add *references* in each function.

include, in each such function, the paper and *code* references for clarity and easy navigation

The image shows a MATLAB project structure on the left and a code editor on the right. The project structure includes folders 'papers' and 'src'. The 'src' folder contains 'Element', which contains 'MechanicalElements', which contains 'CE', which contains '@ContinuumElement'. Inside '@ContinuumElement' are files 'ContinuumElement.m', 'DpROM\_mass.m', 'DpROM\_stiffness\_defect\_derivative.m', 'DpROM\_version.m', 'readme.txt', 'stiffness\_derivative.m', 'Hex8Element.m', and 'Hex20Element.m'. The 'DpROM\_version.m' file is highlighted in green. The code editor shows the contents of 'DpROM\_version.m' with line numbers 1 to 10. The code includes a comment '% DpROM\_version', a code reference '% CODE REFERENCE: ../YetAnotherFcode/papers/DpROM', and a reference section '% Reference:' followed by a citation for Marconi et al. (2021). Arrows indicate the relationship between the project structure, the code editor, and the explanatory text.

```
1 % DpROM_version
2 %
3 % CODE REFERENCE: ../YetAnotherFcode/papers/DpROM
4 %
5 % Reference:
6 % Marconi et al. (2021). "A higher-order parametric nonlinear
7 % reduced-order model for imperfect structures using Neumann
8 % expansion". Nonlinear Dynamics.
9 % https://doi.org/10.1007/s11071-021-06496-y
10
```

these *paper-specific* methods are named "[paper tag]\_[method name].m"