AD FALCON API Manual

PML Example — Fully Coupled Dynamic Impulse (Implicit)

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March 26, 2026

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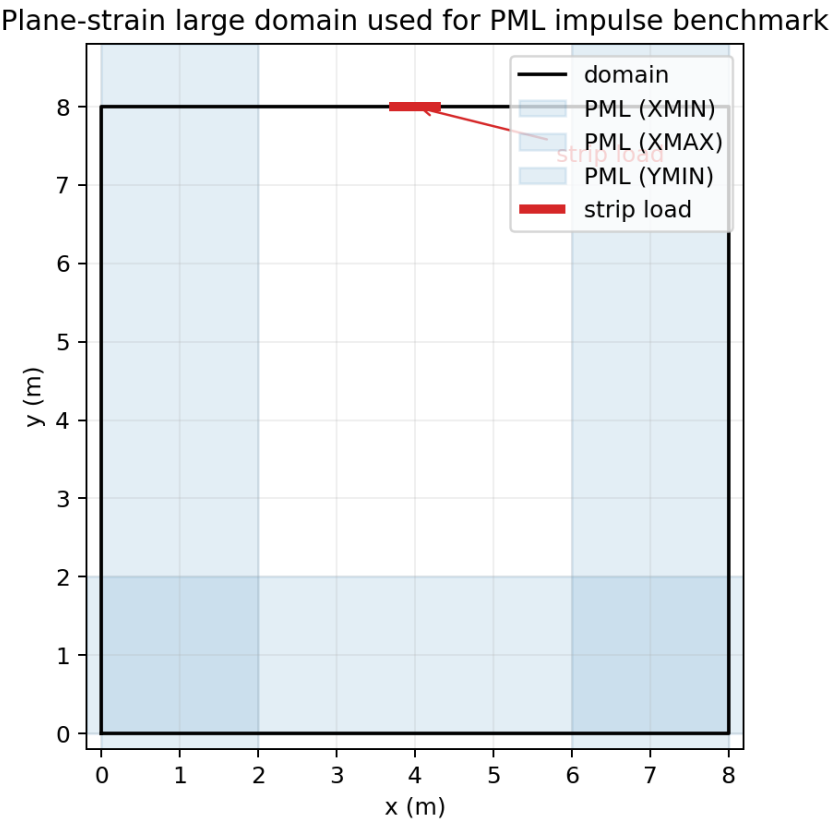

Figure 1: Geometry + PML placement

1 PML Example — Fully Coupled Dynamic Impulse (Implicit)

This page repeats the impulse benchmark for a **fully coupled plane-strain dynamic** analysis (solid + pore water + pore air).

1.1 Model summary

- Geometry: **8 m × 8 m plane-strain** domain (`x ∈ [0,8]`, `y ∈ [0,8]`)
- Load: short **tabular (bipolar) impulse** applied as a strip load at the top surface
- Time integration: **implicit** (`@@SimMode: Dynamic`, `@@TimeIntegration: Implicit`)
- Comparison: **truncated** vs **PML on `XMIN`, `XMAX`, `YMIN`**

1.2 Loading used

The base files define the strip load magnitude via `NormalPressures ...` on the top edge. To better expose boundary reflections, a short **bipolar impulse** is applied via a **tabular load factor**:

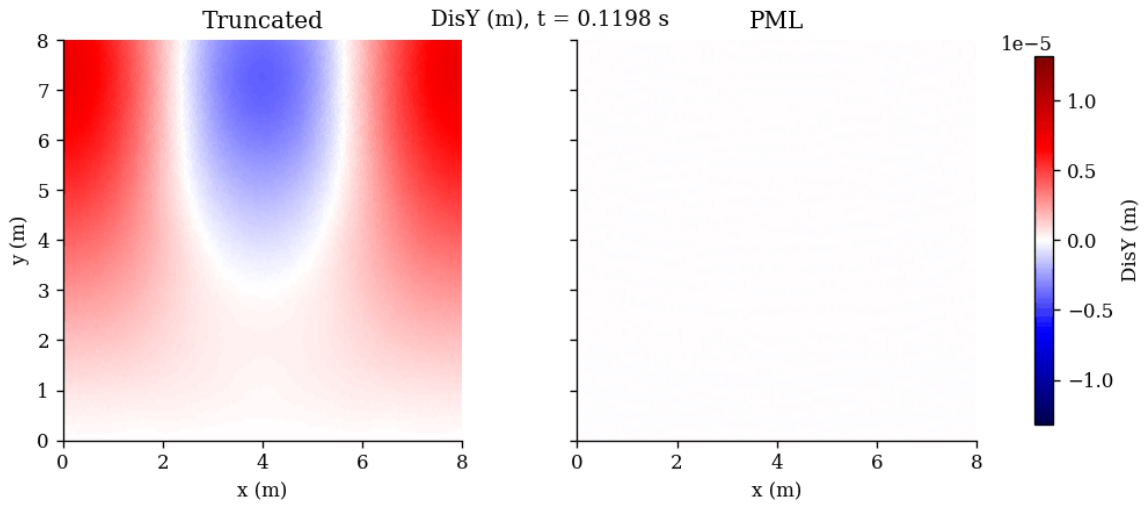

Figure 2: DisY evolution: truncated vs PML (side-by-side)

- `LoadType Tabular Step 1`
- `TabularData 0 0; 0.001 1; 0.002 -1; 0.003 0; 0.12 0`

Here `dt = StepTime / NumberSteps = 0.12 / 1000 = 1.2e-4` s.

1.3 Results

The animation below shows the **DisY** field evolution side by side for the same impulse load:

Figure: DisY field evolution for the same impulse load (left: truncated, right: PML).

Note: animated GIFs loop in the **web** version of the manual. In the **PDF** export, animations are typically rendered as a single (static) frame.

The plots below show the **applied pressure time history** alongside several probe histories (truncated vs PML).

Figure: Applied pressure history (top) and DisY probe responses (bottom) for truncated vs PML.

Pore-water pressure transients at probe points (`% PointStateOutput`, truncated vs PML):

Figure: Applied pressure history (top) and Pw probe responses (bottom) for truncated vs PML.

Pore-air pressure transients at probe points (`% PointStateOutput`, truncated vs PML):

Figure: Applied pressure history (top) and Pa probe responses (bottom) for truncated vs PML.

1.4 Input files

- Truncated: `pml_impulse_large_pl_fullycoupled_truncated.txt`
- With PML: `pml_impulse_large_pl_fullycoupled_pml.txt`

See also: Perfectly Matched Layer (PML)

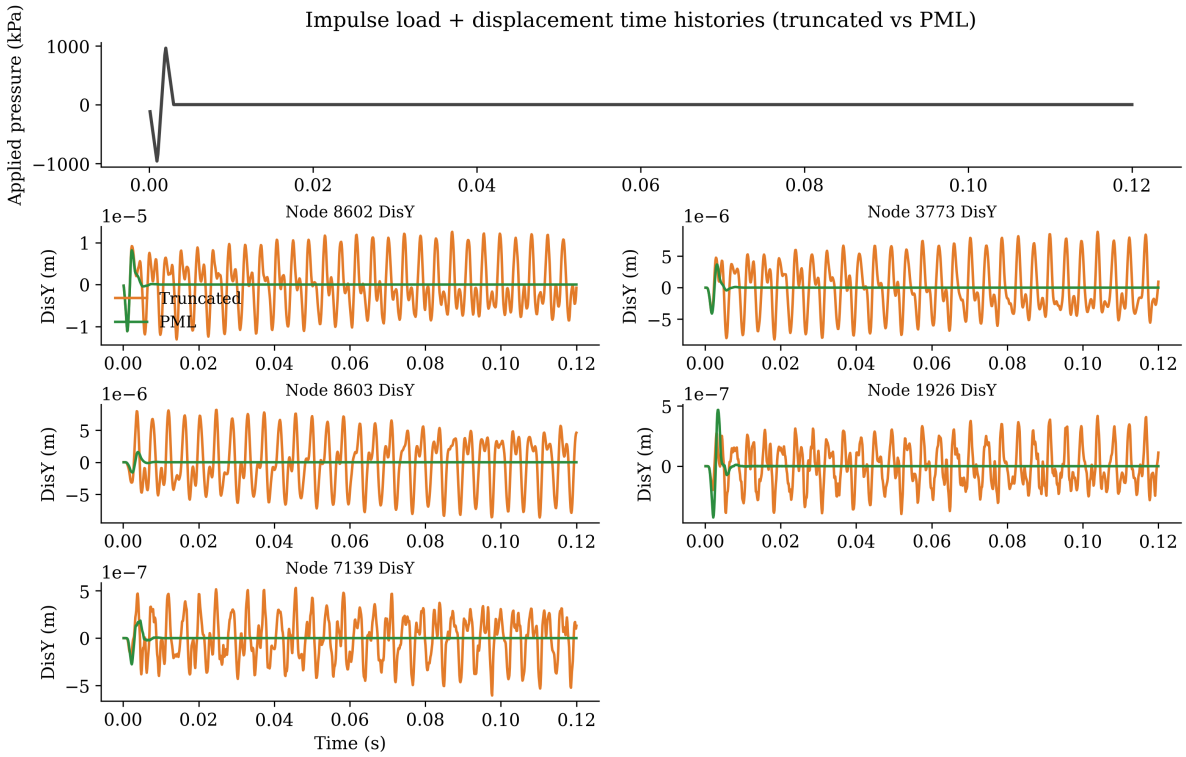

Figure 3: Plane-strain fully coupled DisY impulse response

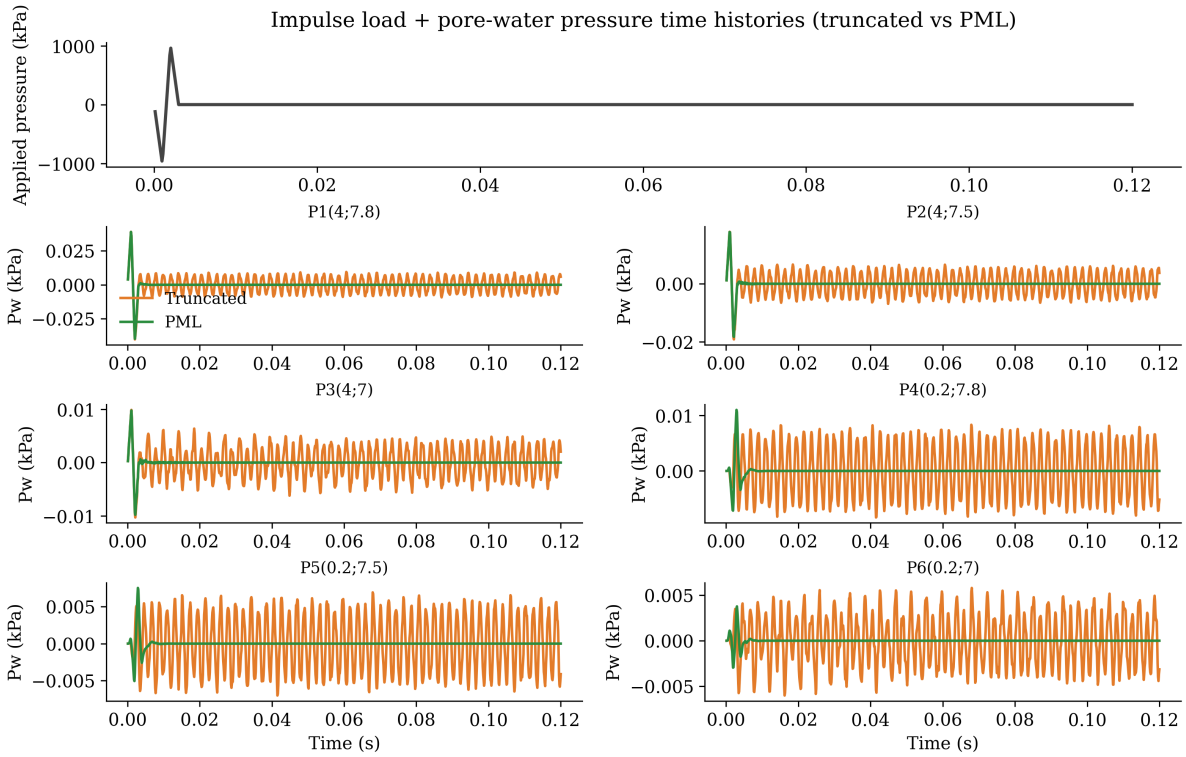

Figure 4: Plane-strain fully coupled PW impulse response

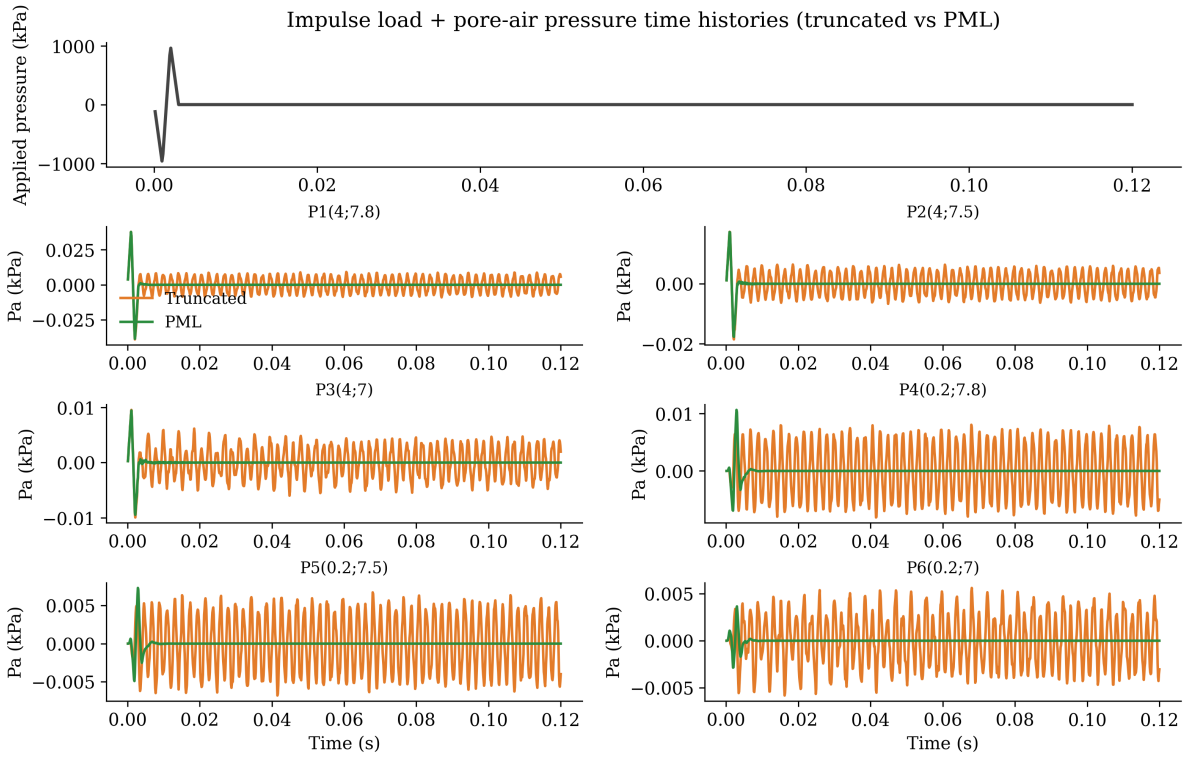

Figure 5: Plane-strain fully coupled PA impulse response