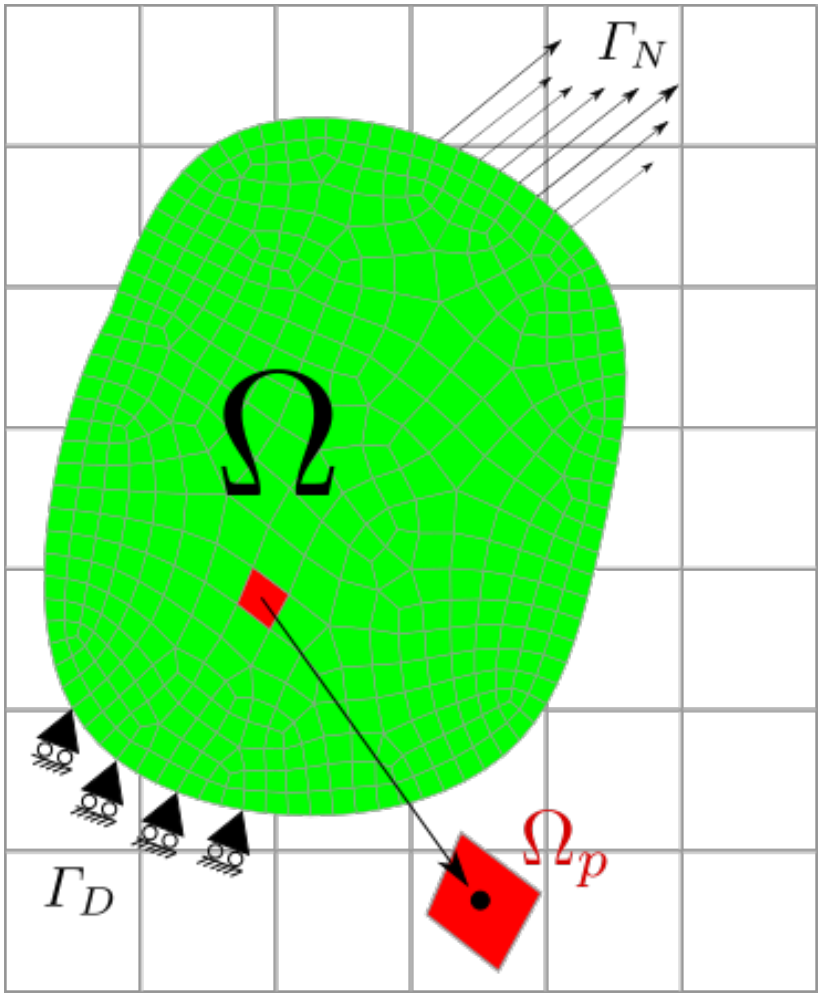


Figure 1: Discretization used in the material point method.

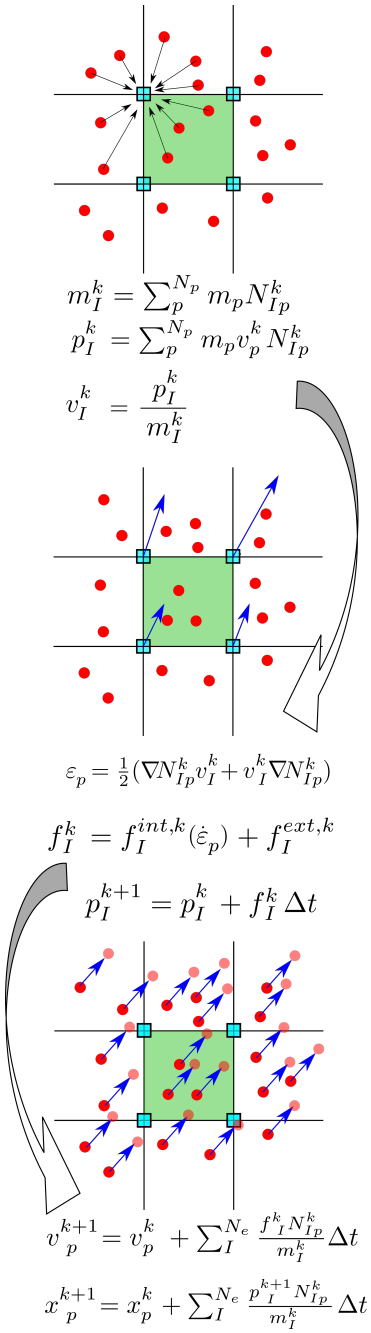
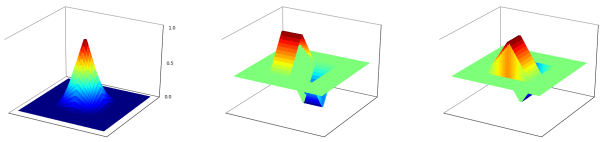
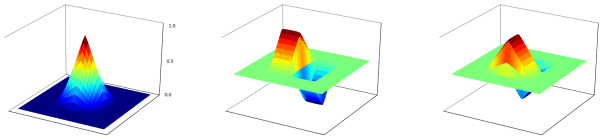


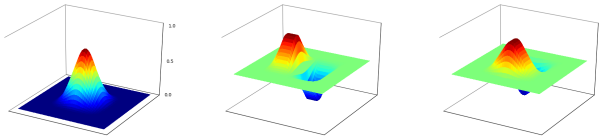
Figure 2: Classic material point method algorithm.



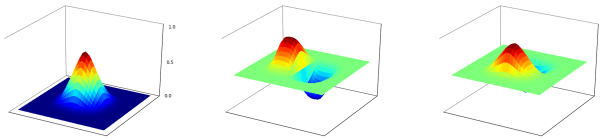
(a) Piecewise linear (Q4).



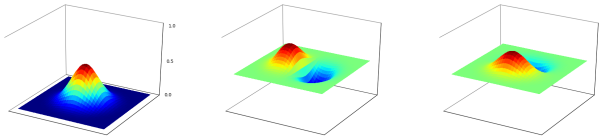
(b) Local *max-ent* $\gamma = 17$.



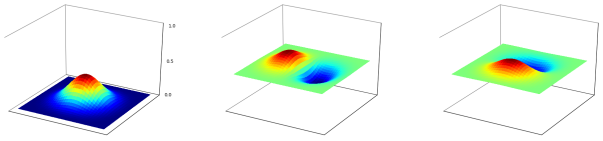
(c) Uniform GIMP (uGIMP).



(d) Local *max-ent* $\gamma = 10$.



(e) Local *max-ent* $\gamma = 7$.



(f) Local *max-ent* $\gamma = 5$.

Figure 3: Comparison of the local *max-ent* shape function for different values of $\gamma = \beta h^2$, the piecewise linear shape function and the uniform GIMP shape function. The picture shows the nodal value of each shape function and its derivatives evaluated in a material point located in the center of the domain.

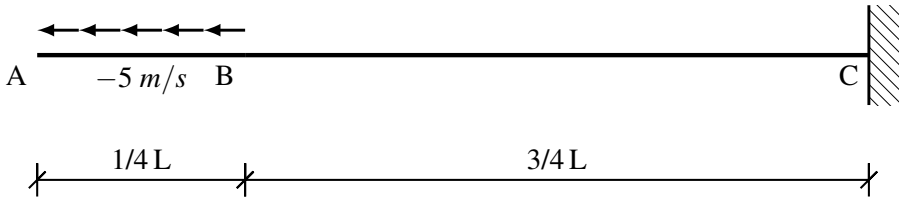


Figure 4: Geometrical description of the Dyka [**?**] bar.

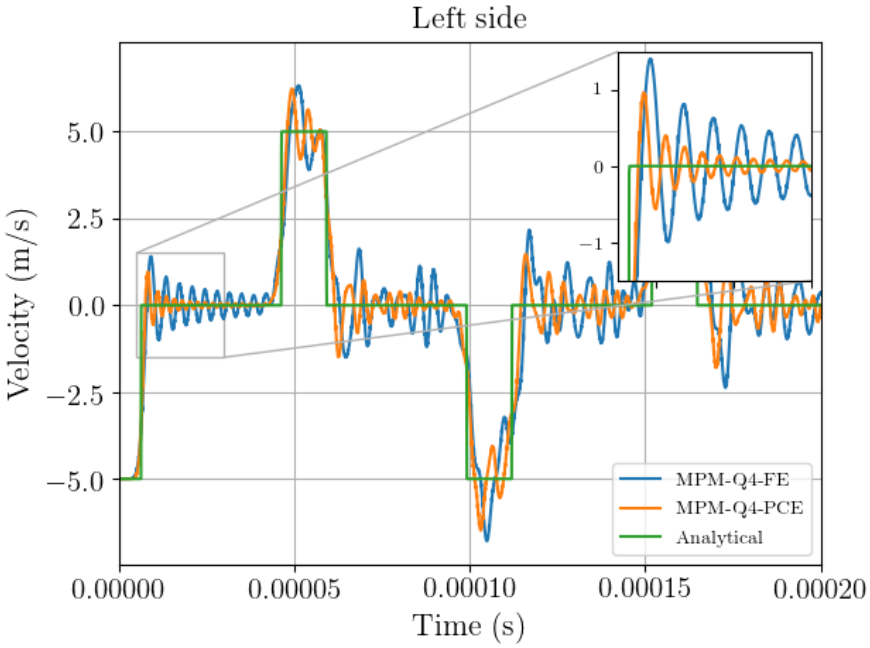


Figure 5: Velocity evolution in the bar left side. This picture shows a comparison of both time integration algorithms, the Forward-Euler (FE) and the Predictor-Corrector explicit (PCE).

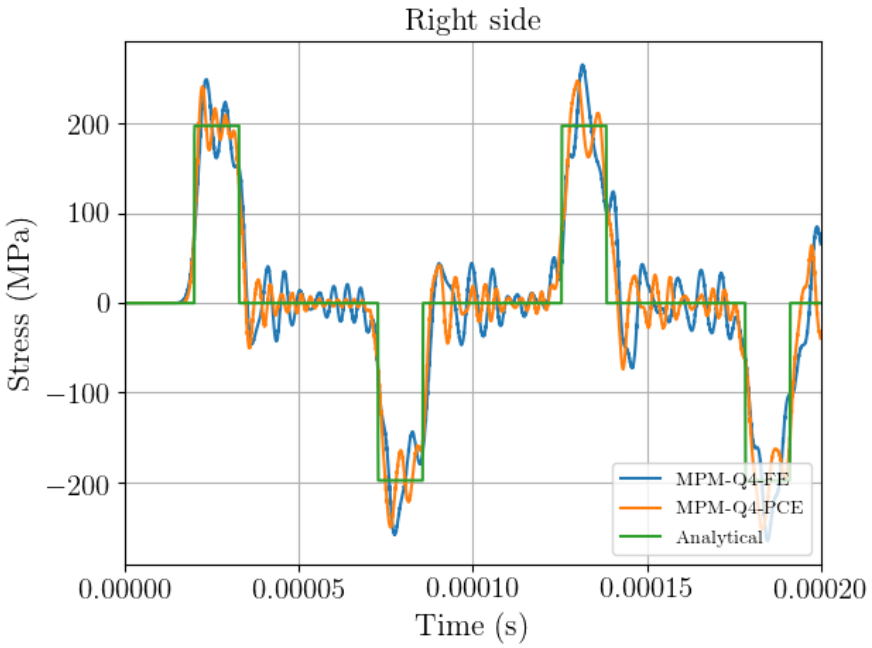


Figure 6: Stress evolution in the bar left side. This picture shows a comparison of both time integration algorithms, the Forward-Euler (FE) and the Predictor-Corrector explicit (PCE).

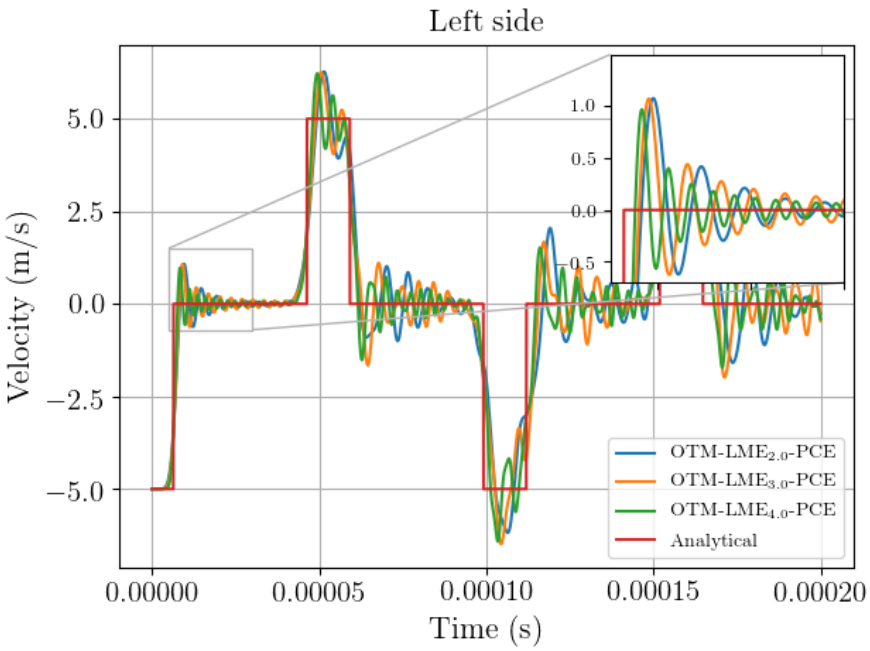


Figure 7: Velocity evolution at the point in the bar left side.

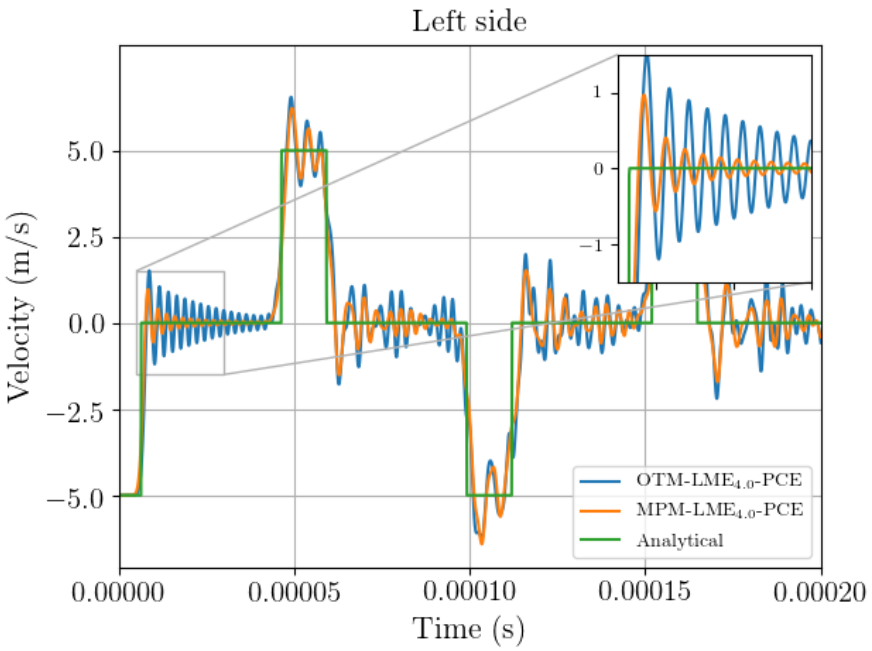


Figure 8: Velocity evolution at the point in the bar left side.

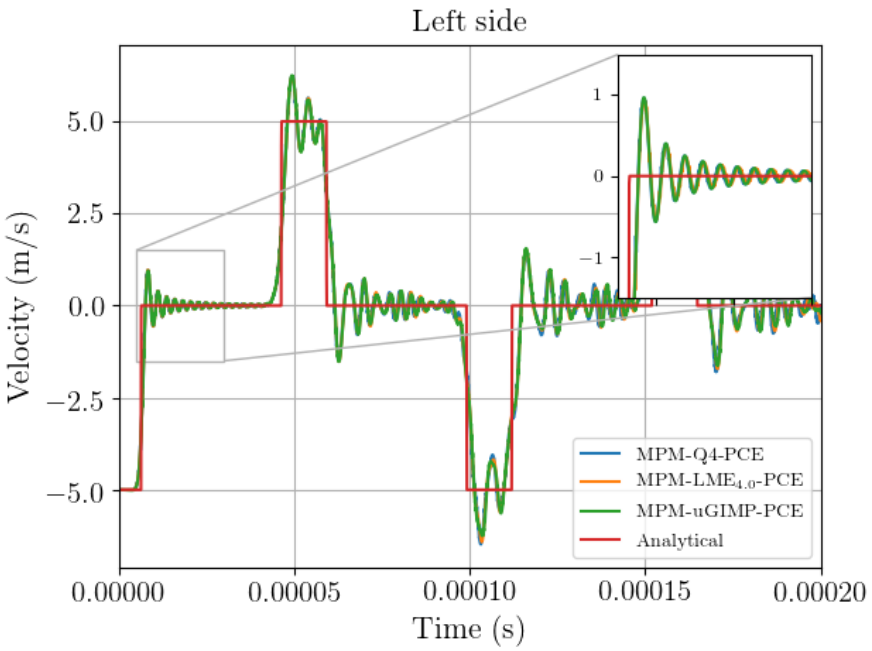


Figure 9: Velocity evolution at the point in the bar left side.

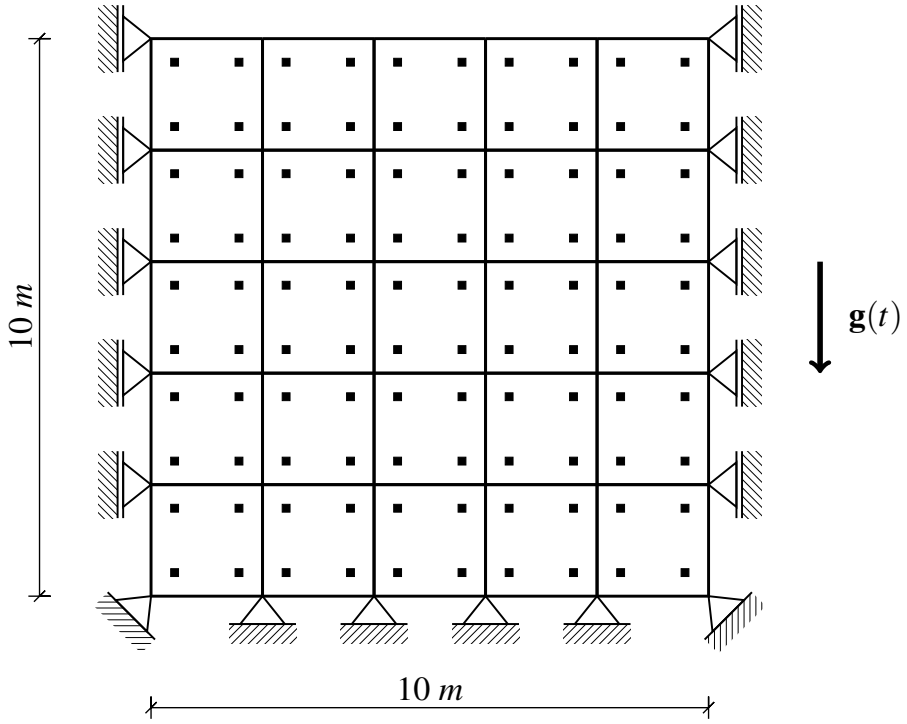


Figure 10: Geometrical description of a soil block

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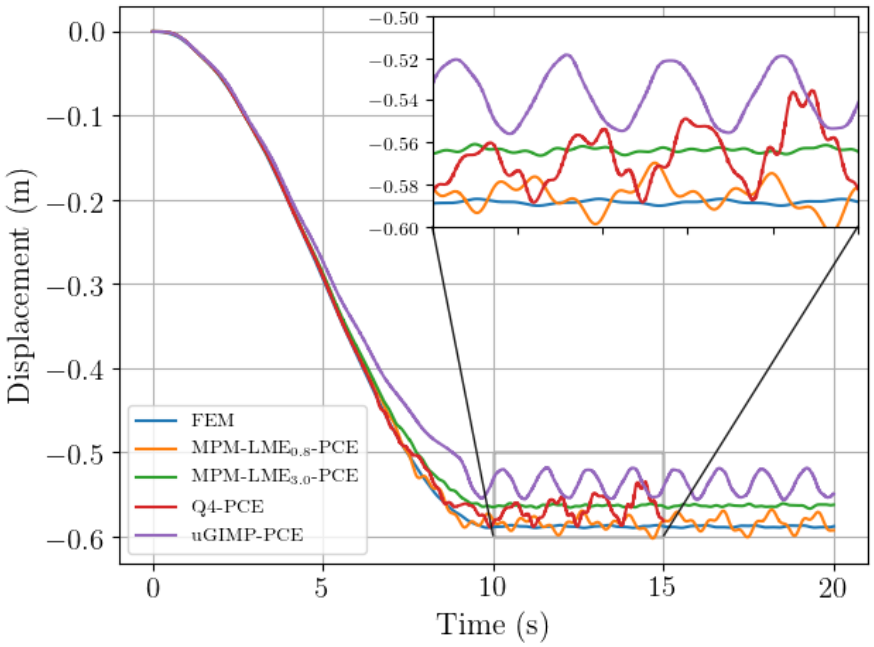
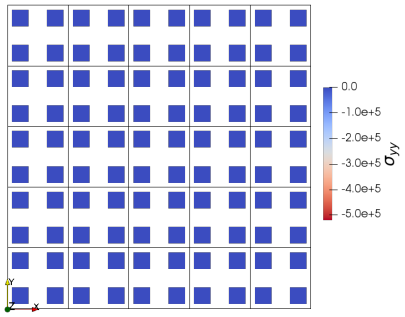
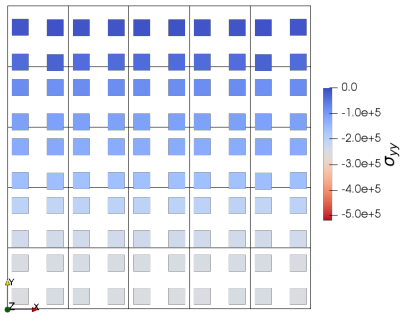


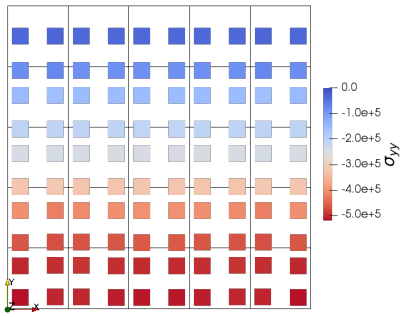
Figure 11: Comparative of the vertical displacement evolution in a point located in the free surface employing different interpolation schemes and numerical techniques.



(a) t = 0 seconds.



(b) t = 5 seconds.



(c) t = 20 seconds

Figure 12: Vertical normal stress and position of material points during the loading process for a soft soil ($E = 5\ MPa$, $\rho_0 = 6 \cdot 10^3\ kg/m^3$). Numerical parameters considered for the simulation are : Local *max-ent* shape function $\gamma = 3$ and explicit PC scheme with CFL 0.1.

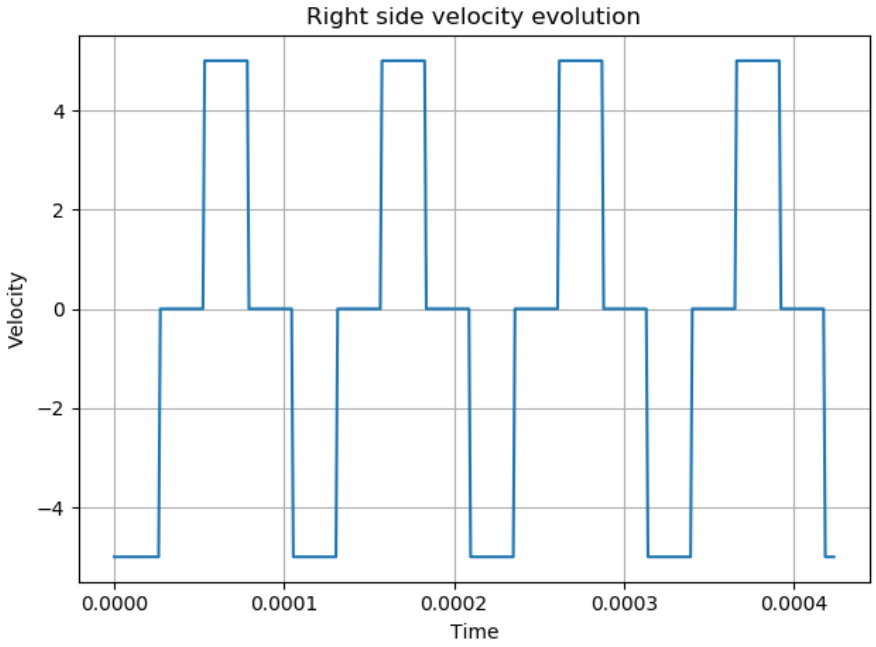


Figure 13: Analytical solution for the velocity in the right side of the Dyka bar.

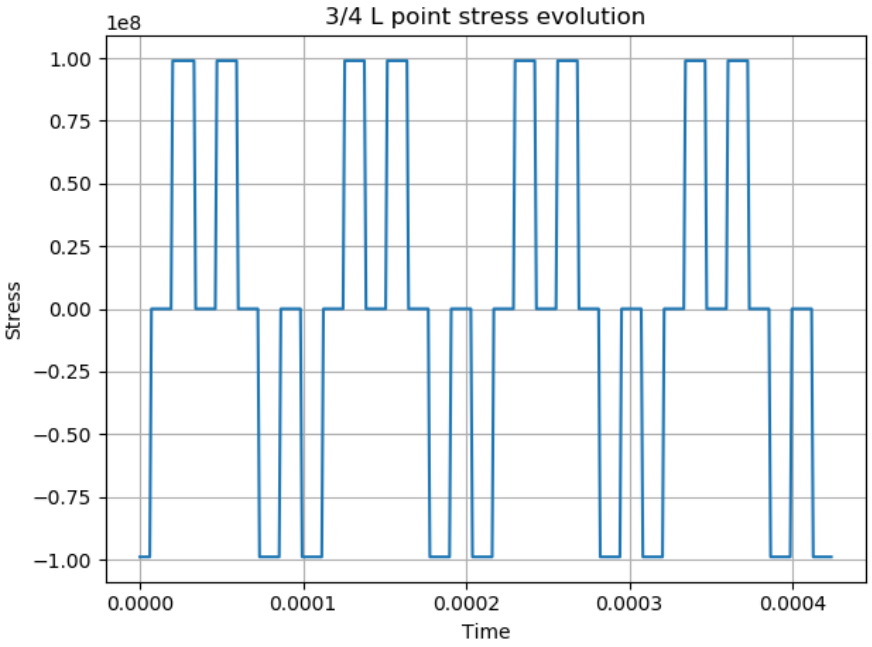


Figure 14: Analytical solution for the stress in the last quarter of the Dyka bar.