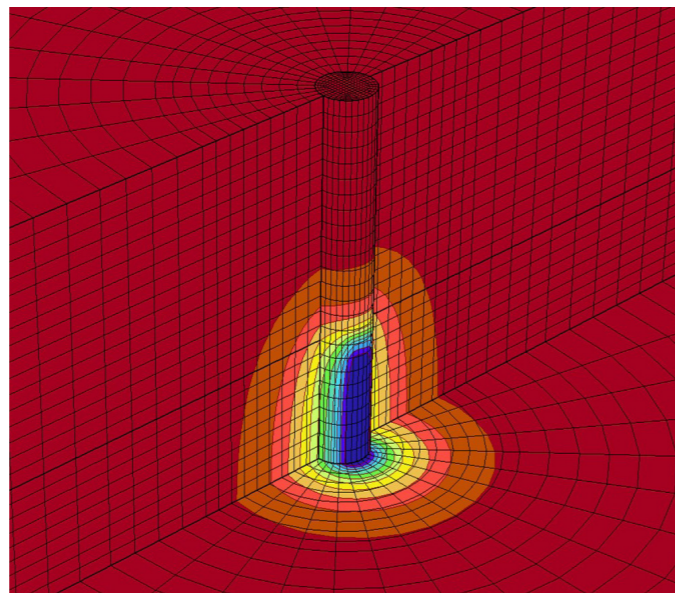


# What's New in ZSoil 2023 and 2024?

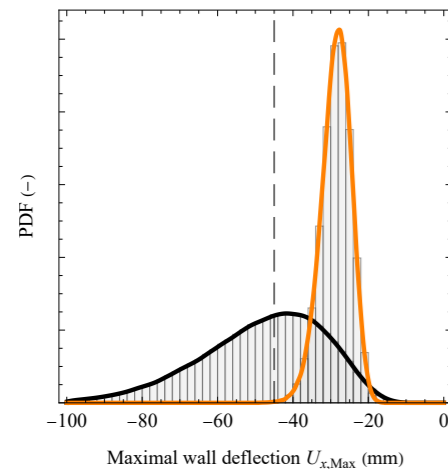
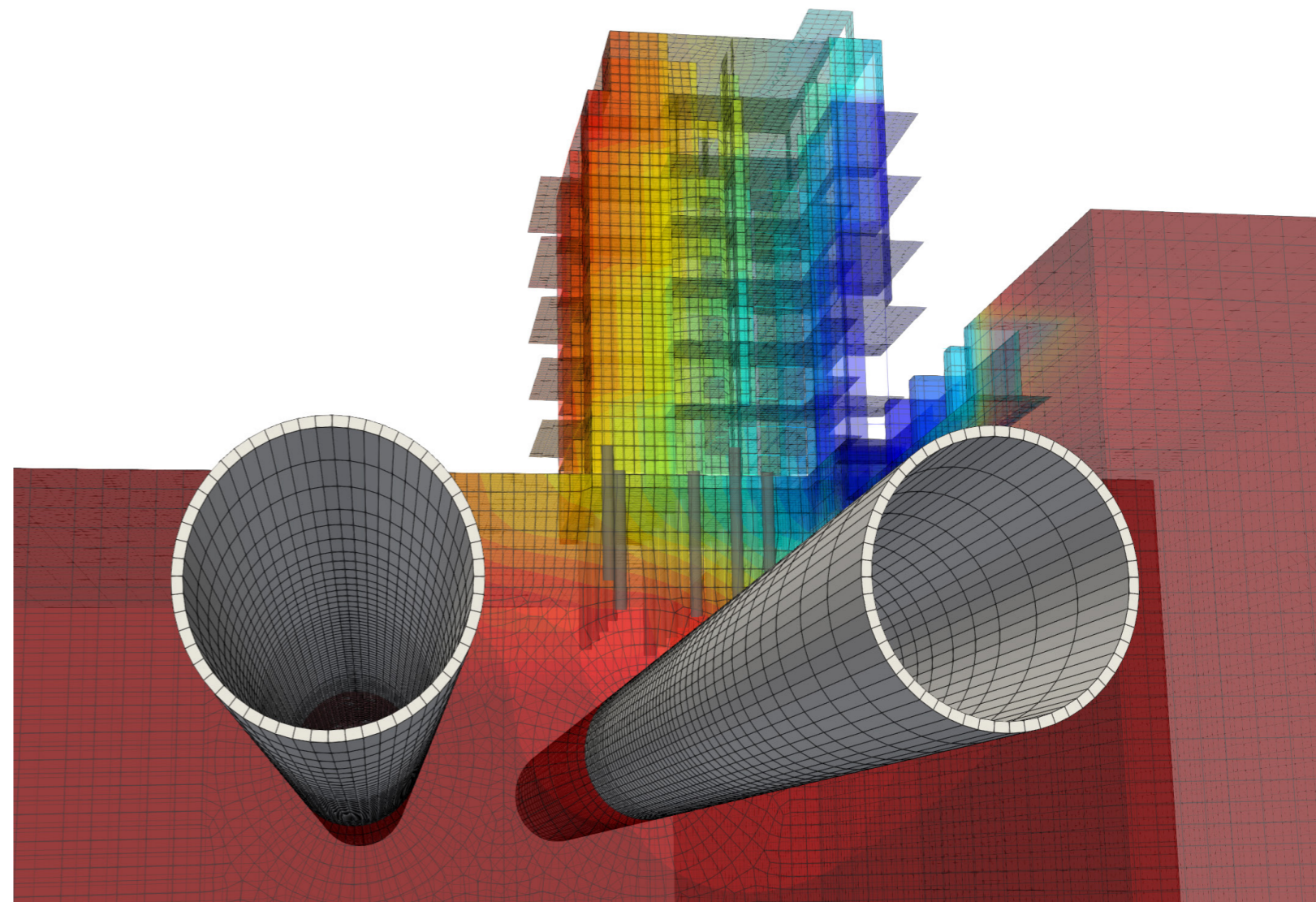
ZSoil is continuously developed with new features added regularly

- Non-local formulation for **piles and barrettes** for reduced mesh dependency
- Full form of **van Genuchten's soil-water retention curve**, including a calculator enabling parameter estimation based on standard geotechnical data
- **Weakly coupled hydro-thermal formulation** enables taking into consideration partial saturation, advection, effective thermal conductivity and volumetric heat capacity computed for a two-phase medium with groundwater flow
- Explicit and implicit modeling of **heat exchangers**



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## What next in 2025?

- **Uncertainty quantification**, reliability and sensitivity analyses for Reliability Based Design (RBD)
- **Moving loads** along a specified path on 2D and 3D members, model complex load patterns to model vehicle traffic or other special moving load on the surface of structures or continua
- **Graphical user interface** improvements
- **Calculation module** speedup

## Training courses

Annual ZSoil courses held at the end of August

Online webinar via Zoom Wednesday/Thursday August 27-28th 2025

**Custom training** can be arranged to suit your Needs. Email us.

Presentations from the annual user conferences available online providing many examples and expert knowledge for beginners to advanced users.

## User Meeting

Symposium on Numerics in Geotechnics and Structures 2025

**40 years of ZSoil & Structures**  
Live at HEIA (and via Zoom) Friday August 29th 2025

09:00 - 17:30  
Fribourg, Switzerland



ZSoil by GeoDev. [info@geo-dev.ch](mailto:info@geo-dev.ch) - [zsoil.com](http://zsoil.com)

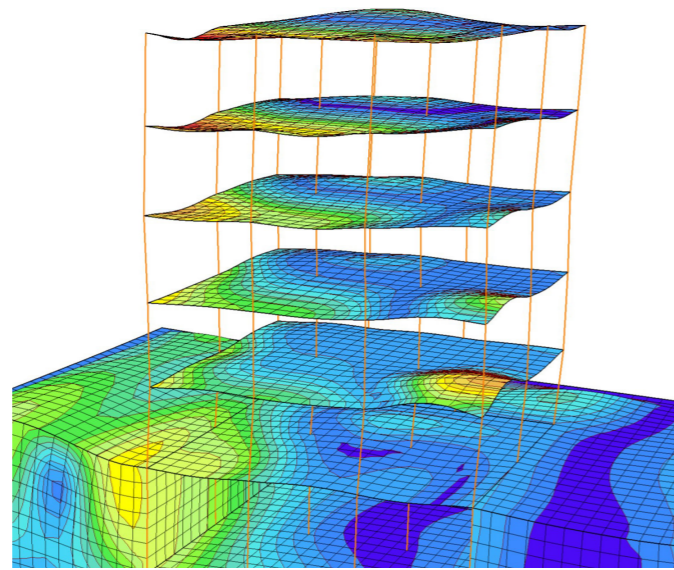
## A powerful partner for solving your geotechnical dilemmas

FE modelling & design of soil structure interaction problems

Foundations and structures • Deep excavations • Retaining structures • Piles and barrettes • Tunnelling • Embankments • Slopes • Landslides • Roads and Railways • Bridges • Dams • Earthquake engineering • Energy geostructures • Heat exchangers • Fire impact • Underground flow

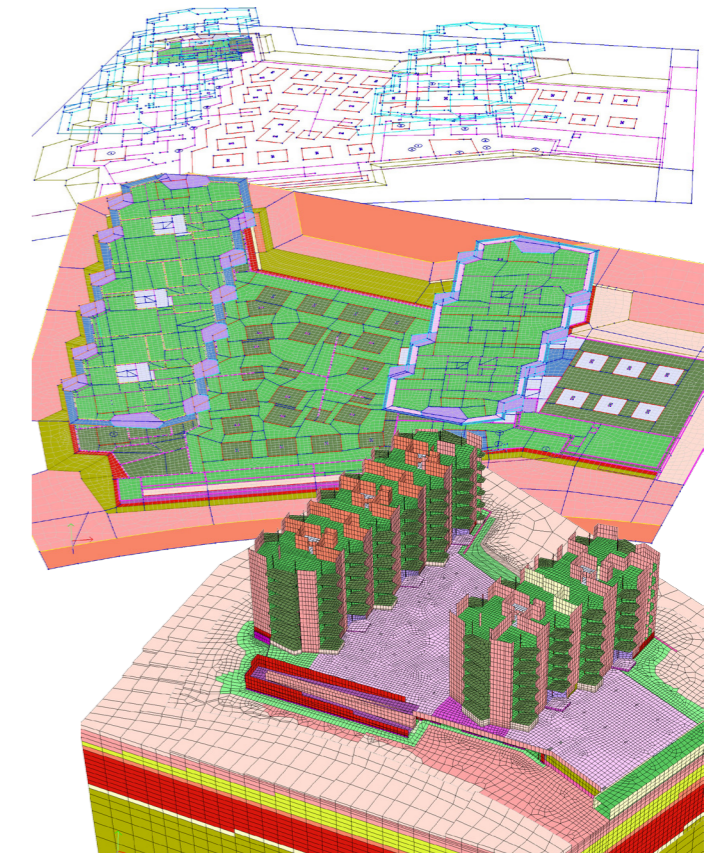
## Analysis types

- **Initial state** (gravity/K0) including groundwater level ensures a realistic replication of initial stress conditions for existing built-up environment
- **Single phase** solid deformation, fluid flow, thermal or moisture migration which can be later integrated to mechanical analyses
- **Two phase** for saturated and partially saturated continua, steady state, transient, perfectly undrained, consolidation & Bishop's effective stress principle
- **Stability/safety factor** via  $\tan(\phi)$ -c reduction or stress level algorithms
- **Dynamic time history** for earthquakes and wave propagation through saturated or partially-saturated including Domain Reduction Method (DRM)

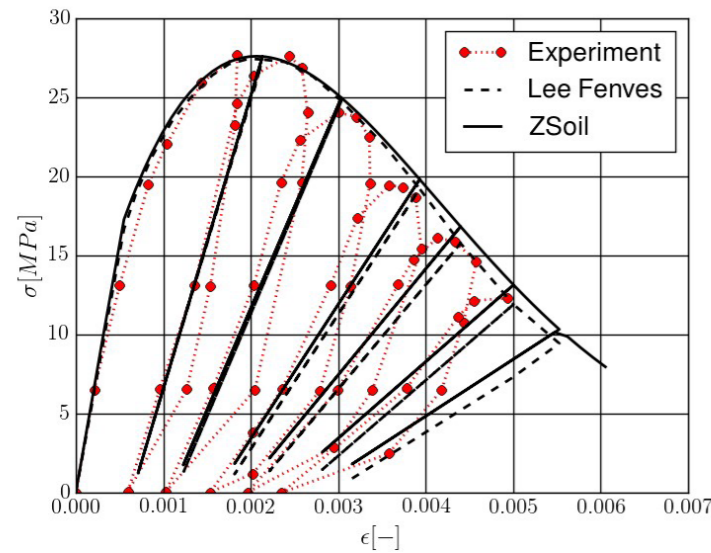


## Workflow

- **Model preparation** - advanced, flexible and unconstrained user-driven FE model preprocessing
- **Geometry import from DXF** preserving layer colors for an efficient and transparent macro model generation
- **Rhino formats plugin** for geometry and mesh imports
- **Structured and unstructured macro meshing** with full control over the final FE mesh
- **Assembling final FE models** from subsidiary input files (team-oriented workflow)
- **Mapping of geological model** based on boreholes and kriging interpolation
- **Visual verification of excavation/construction stages** before running the simulation
- **Automatic data verification tools**



## Constitutive models

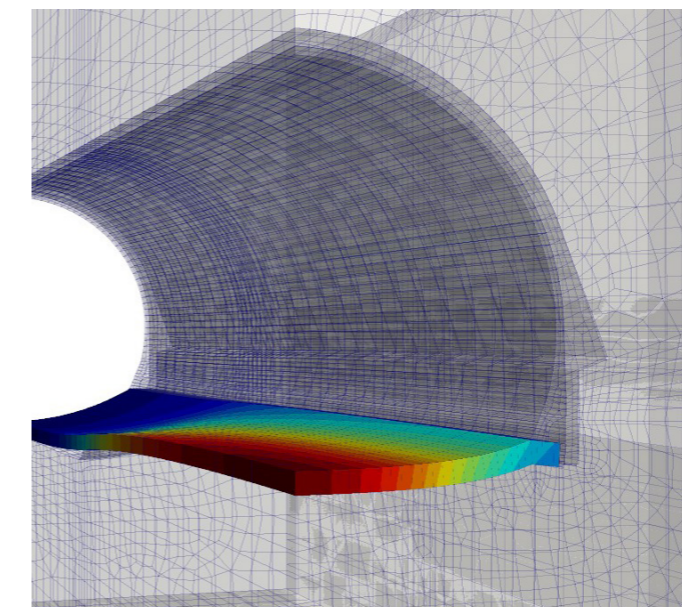
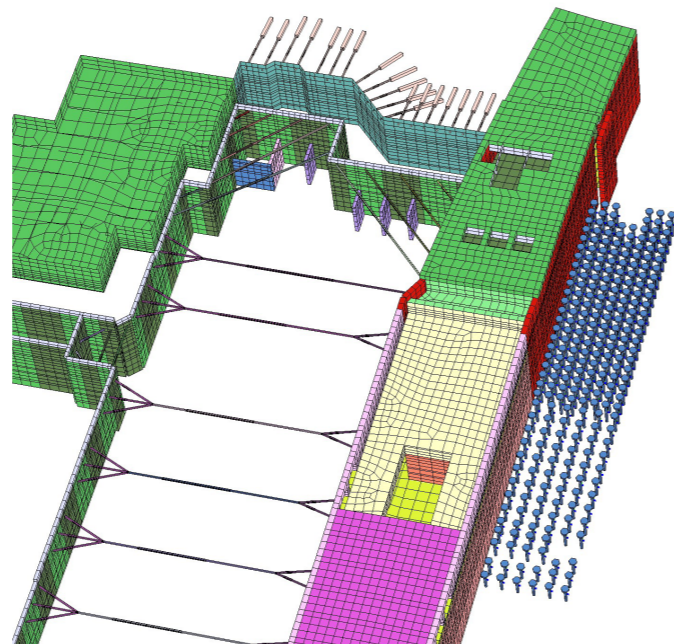


- **Hardening Soil Model** including improved small strain formulation (HS-Brick)
- **Mohr-Coulomb** (with softening on demand)
- **Hoek-Brown**, original (basic) and extended features including hardening and softening mechanisms
- **Multi-laminate** for modeling foliated rocks
- **Modified Cam-Clay**
- **Densification model** for liquefaction (with HSM features)
- **Damage-Plastic Concrete Model** (with fire extension) for advanced representation of concrete behavior
- **Creep and swelling**
- **Virtual Lab** toolbox provides the users with assistance to parameter selection for soil models

## Element types

All structural elements available in both elastic or elasto-plastic formulations

- **Truss /Anchor** with embedded grouting section
- **Tendon** with pre- or post-tensioning
- **Beam** standard elastic or composite beams with a core material + reinforcement
- **Nail** (embedded beam with ultimate shear strength resistance)
- **Pile** (embedded beam element with Coulomb frictional interface, and the tip resistance)
- **Membrane**
- **Shell** elements represented as infinitely thin FE elements or thick (volumetric) ones
- **Interface elements** described by Coulomb type frictional contact formulation.



## Analysis of results

- **Color maps** for any computed quantity
- **Deformed mesh and vectors**
- **Plastic zones**
- **MNT diagrams and envelopes** for structural elements and integration from continuum elements
- **Sectional quantities**
- **Time-history series**
- **Eigen modes / Pushover**
- **Export to CSV** file format
- **Python wrapper** for faster remote analyses of the computed results and customized reports
- **Export to VTK** format compatible with Paraview
- **Can be inspected during computing**

## Template modelling

Includes two templates for speeding up model generation; also available as stand-alone applications:

- **ZSwalls** diaphragm/sheet and soldier pile retaining walls
- **ZSslope** slope stability with steady-state or transient two-phase formulation, including rain inflow

