



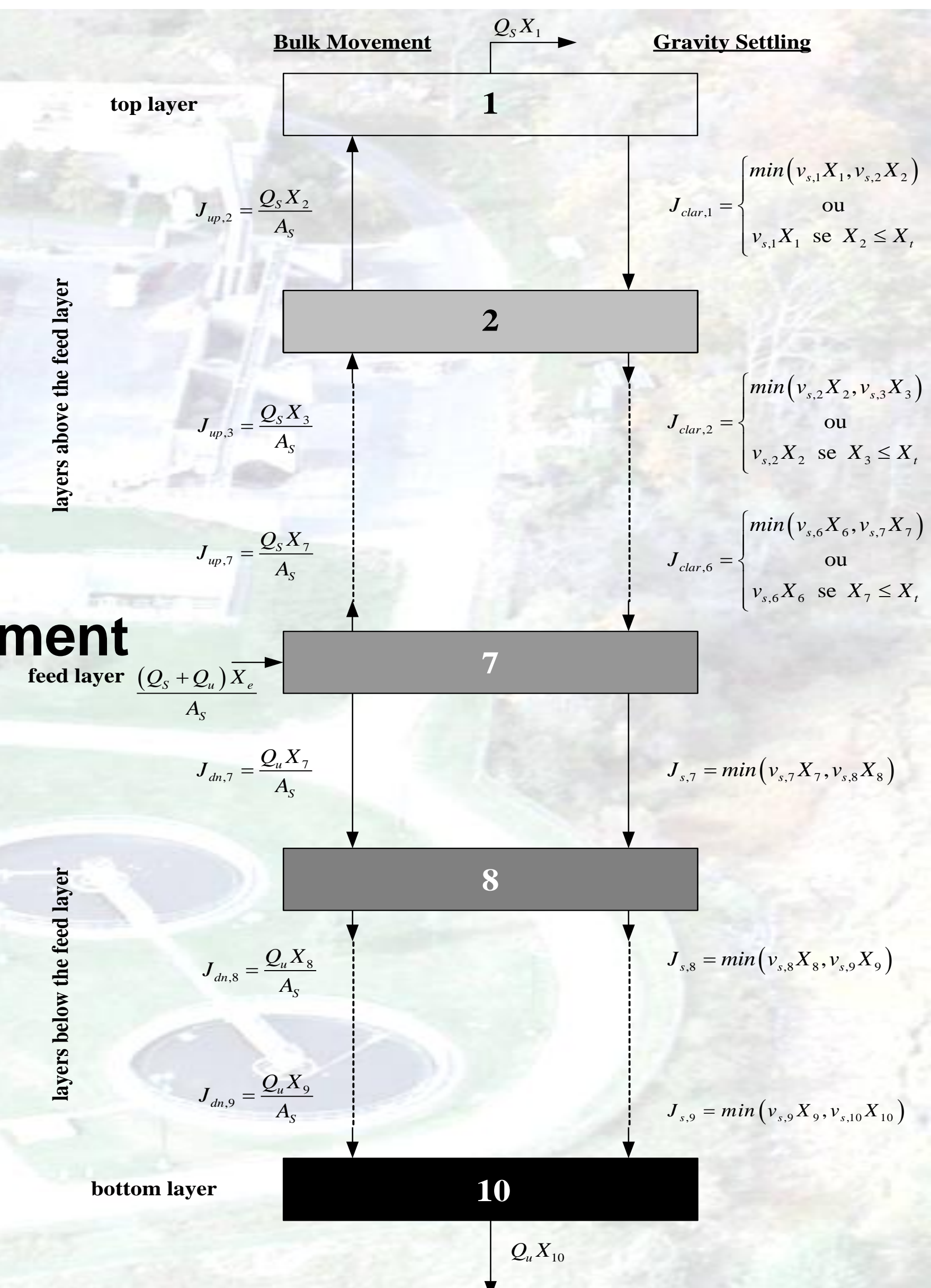
Derivative-Free Optimization (DFO)

To accomplish in the active research area of derivative-free methods:

- Investigate better ways of dealing with constraints
- Incorporate a stochastic approach for local search improvement
- Introduce discrete variables
- Furnishing code to be publicly available
- Incorporate dynamic processes in the Wastewater Treatment Plant Design
- Address practical problem in Astrophysics

Research Team

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Publications

- Matias, J.L.H.; Fernandes, E.M.G.P., A derivative free penalty technique and the PNL-Pesdir tool, **XXVIII Congreso de Estadística e Investigación Operativa**, ISBN: 84-689-0438-4, 12 pp, Cádiz, 2004.
- Espírito-Santo, I.A.C.P.; Fernandes, E.M.G.P.; Araújo, M.M.; Ferreira, E.C., Optimization and simulation of secondary settler models, **6th. WSEAS International Conference on Simulation, Modelling and Optimization**, A.M. Madureira (Ed.), ISSN: 1790-5117, ISBN: 960-8457-53-X, CD-ROM, 240-245, 2006.
- Espírito-Santo, I.A.C.P.; Fernandes, E.M.G.P.; Araújo, M.M.; Ferreira, E.C., On the secondary settler models robustness by simulation, **WSEAS Transactions on Information Science and Applications**, ISSN: 1790-0832, Issue 12, Vol. 3, 2323-2330, 2006.
- Espírito Santo, I.A.C.P.; Fernandes, E.M.G.P.; Araújo, M.M.; Ferreira, E.C., Cost minimization of a WWTP using an augmented Lagrangian pattern search based solver, **10 th. IWA Specialised Conference on Design, Operation and Economics of Large Wastewater Treatment Plants**, 17-20, Vienna, 2007.
- Espírito Santo, I.A.C.P.; Fernandes, E.M.G.P.; Araújo, M.M.; Ferreira, E.C., An augmented Lagrangian pattern search method for optimal WWTP designs, **6 th. WSEAS International Conference on System Science and Simulation in Engineering**, 6 pp, Venice, 2007.

Software

PNL-Pesdir tool - software for non-smooth constrained nonlinear optimization (www.norg.uminho.pt).

PPSDONL - Augmented Lagrangian pattern search solver with interface to AMPL.

MSc and PhD Theses

- Matias, J.L.H., Técnicas de penalidade e barreira baseadas em métodos de pesquisa directa e a ferramenta PNL-Pesdir, PhD thesis, Universidade de Trás-os-Montes e Alto Douro, 2003, supervisor: Fernandes, E.M.G.P.
- Espírito Santo, I.A.C.P., Desenho óptimo de estações de águas residuais através da modelação de funções custo, PhD thesis, Universidade do Minho, 2007, supervisors: Fernandes, E.M.G.P.; Araújo, M.M.
- Correia, A.I.A., Optimização não linear com restrições, sem uso de derivadas nem função mérito, PhD thesis, Universidade de Trás-os-Montes e Alto Douro, supervisors: Matias, J.L.H.; Vaz, A.I.F. (ongoing).
- Moreira, R.M.R., Algoritmos para optimização não linear com restrições sem uso de derivadas, PhD thesis, Universidade de Trás-os-Montes e Alto Douro, supervisor: Matias, J.L.H. (ongoing).
- Gonçalves, C.M.R.R., Programação não linear no ensino secundário, MSc thesis, Universidade de Trás-os-Montes e Alto Douro, supervisor: Matias, J.L.H. (ongoing).