

BEI

3HY E&P



Modelisation of oxidation ditches in
wastewater treatment

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Plan

- ▶ **Industrial context**
 - ▶ Oxidation ditch
 - ▶ Partners
 - ▶ Project
- ▶ **Subject**
- ▶ **Bibliography**
- ▶ **Working plan**

Industrial context (1 / 3)

Oxidation ditch



Industrial context (1 / 3)



ITT



Dominique LEGENDRE

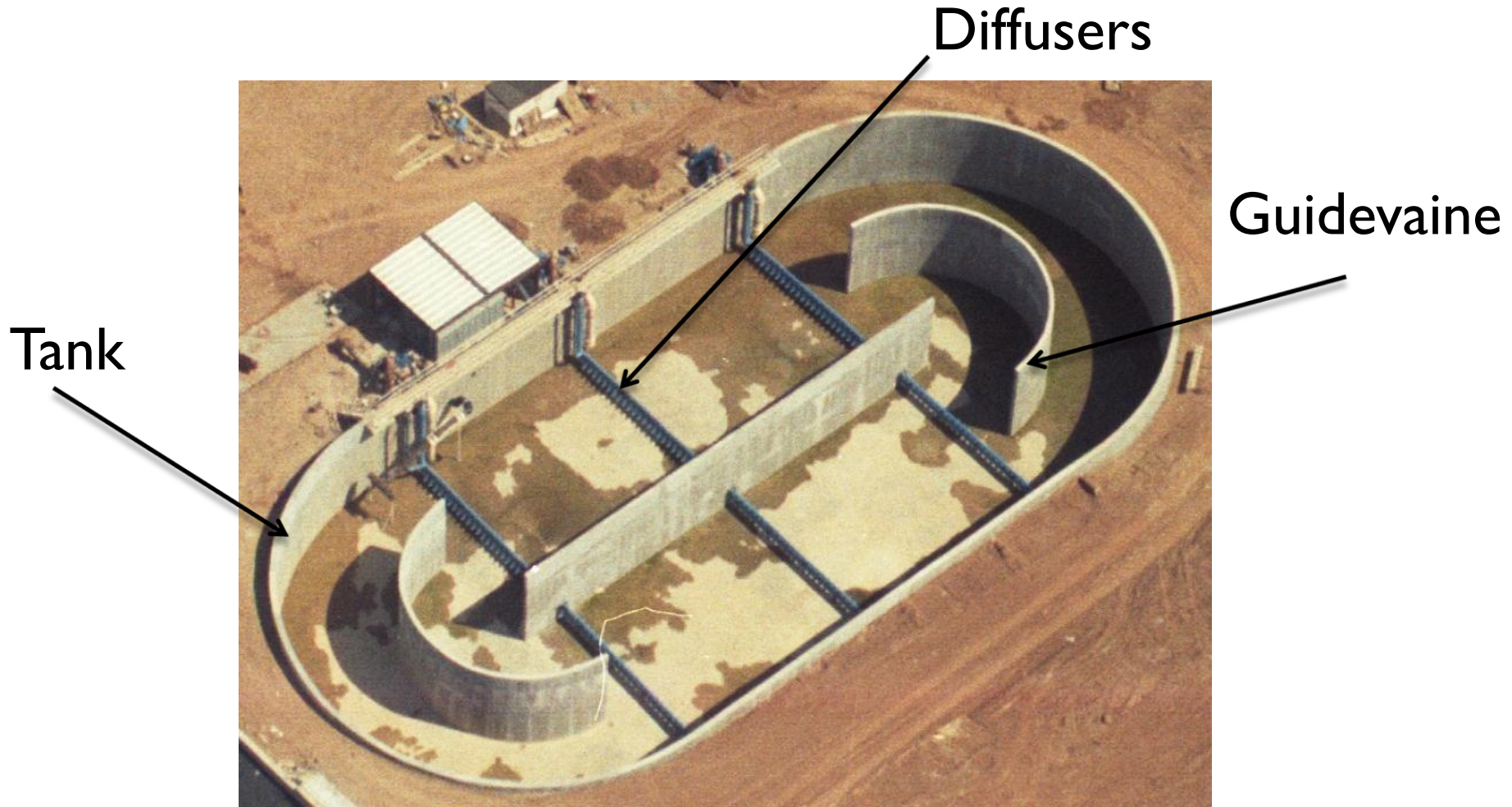
Arnaud COCKX

Industrial context (3 / 3)

O₂STAR project :

- ▶ Development of software for the conception, sizing and optimization of aeration system in wastewater treatment plant
- ▶ For water treatment industries
- ▶ From experiments and numerical tools
- ▶ To predict precisely the oxygenation capacity of oxidation ditch

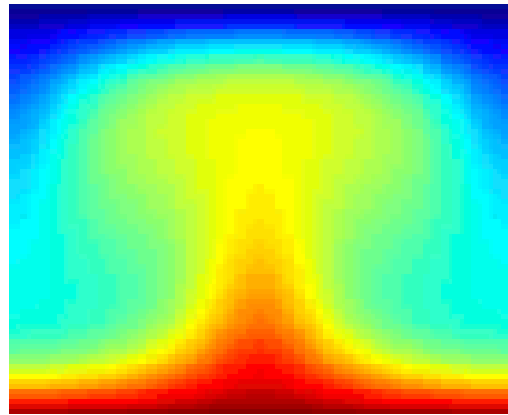
Subject (1/2)



Subject (2/2)

- ▶ To write a wired hydraulic model
 - ▶ Mass conservation & energy-momentum conservation equations
 - ▶ Coupling of differential equations for the gaz and for the liquid phases

- ▶ Problem of spiral flow



- ▶ Distribution of residence time inside the oxidation ditch

Bibliography

- ▶ Simulation of hydrodynamic in oxidation ditches
Pierre Tanguy (2003)
- ▶ Flow field and residence time distribution simulation of a cross-flow gas-liquid wastewater treatment reactor using CFD
- ▶ Comparison of systemic, compartmental and CFD modelling approaches :Application to the simulation of biological reactor of wastewater treatment
Le Moullec – Potier – Gentric – Leclerc (2008)
- ▶ Global modelling of a gaz-liquid-solid airlift reactor
Talvy – Cockx – Line (2005)
- ▶ Mass transfer in a external-loop airlift reactor : experiments and modelling
Dhaouadi – Poncin – Hornut – Wild – Oinas – Korpijarvi (1997)
- ▶ Oxygen transfer prediction in aeration tanks using CFD
Fayolle – Cockx – Gillot – Roustan – Héduit (2007)

Working Plan

- ▶ Bibliography
- ▶ Establishment of a list of significant parameters and variables
- ▶ Modeling : wired equations :
 - ▶ Liquid only
 - ▶ Gaz :
 - ▶ Without liquid movement => bubbles rising – recirculation problem
 - ▶ With liquid movement