

## **Modeling and design of outfalls using CORMIX**

*Modelagem e desenho de emissários usando CORMIX*

**Agosto 8 e 10 e 12, 2011, Curitiba, UFPR**

### **Content**

Worldwide, the use of outfalls is increasing rapidly. Submerged multiport diffusers are gaining increased acceptance as effective means for the disposal of treated municipal or industrial wastewater, stormwater and combined sewer overflows, cooling water, and brine effluents from desalination plants into coastal waters and estuaries. The main objectives of the workshop are the planning, design and environmental assessment of such discharges.

The course is designed to provide technical training and guidance to engineers, scientists, regulators, and consultants on the discharge management with special focus on brine discharges. The course will cover an introduction to pollutant transport modelling, and mixing zone water quality assessment. Mixing processes are discussed in detail and will be described by simple screening equations and further detailed modelling with the CORMIX system.

Quantitative elements to describe and analyze water quality impacts are provided as well as additional qualitative features. This allows the engineering design of discharge structures and their regulatory licensing. The course covers submerged single port and multiport discharges as well as surface discharges. Presented discharge problems are related to: Conventional waste water discharges, Industrial discharges, Cooling water discharges, Desalination plant discharges, into: Rivers and channels, Reservoirs (influence of stratification considered), Estuaries (with density stratification and tidal currents), Coastal waters, Offshore deep ocean.

### **CORMIX**

The CORnell MIXing Zone Expert System ([www.cormix.info](http://www.cormix.info)) was developed at Cornell University in USA from G. H. Jirka and R. L. Doneker. CORMIX presents an efficient three-dimensional modelling of numerous mixing and transport processes with high spatial detail and multiple complex discharge characteristics and receiving waters characteristics. For point source discharges the CORMIX modelling system is appropriate to predict near-field mixing processes and therefore water quality impacts. CORMIX is user friendly and already used worldwide (it is the standard model for environmental impact studies of the U.S. EPA). Quantitative elements to describe and analyze water quality impacts are given by text and graphic information as well as additional qualitative features. This allows the engineering design of discharge structures and regulatory licensing in short time. The software is divided in several modules to model either submerged single port or multiport discharges as well as surface discharges.

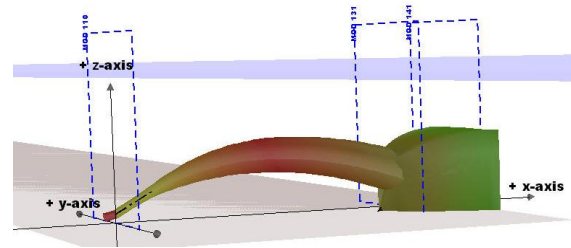
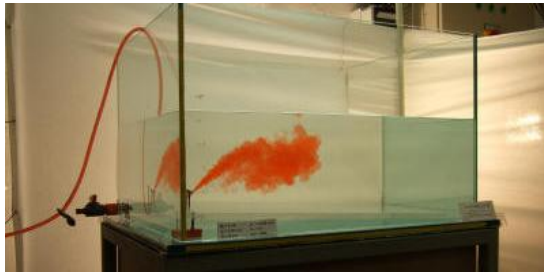
CORMIX simulates discharge problems for:

- Conventional waste water discharges
- Industrial discharges
- Cooling water discharges
- Desalination plant discharges

in:

- Rivers and channels
- Reservoirs (influence of stratification considered)
- Estuaries (density stratification and tides considered)
- Coastal waters

- Deep ocean



Left: Laboratory setup to visualize a dense brine discharge resulting from a reverse osmosis sea-water desalination plant; Right: Modeled dense discharge with CORMIX.

### **Target group**

Engineers from agencies, governmental institutions, industry and municipalities, as well as consultant firms and university research institutions (graduate students, scientists), who are working with planning, analysis, design, licensing and monitoring of discharges into water bodies.

### **Docente**

Prof. Dr.-Ing. Tobias Bleninger, Karlsruhe Institute of Technology, Alemanha, atualmente trabalhando como professor visitante na UFPR em Curitiba. Vice-chair of the IAHR/IWA Joint Committee on Marine Outfall Systems ([www.outfalls.net.ms](http://www.outfalls.net.ms)).

### **General Information**

#### **Location**

Centro Politecnico, UFPR, Curitiba

#### **Price**

O curso é grátis para alunos de mestrado ou doutorado.

Materiais vão ser distribuídos no formato digital (por favor trazer pen-drive).

#### **Registration**

To register, please subscribe per mail: Tobias Bleninger ([bleninger@kit.edu](mailto:bleninger@kit.edu))

Workshop is limited to 10 participants.

#### **Language**

The workshop will be given in English.

### **Programa**

#### **Segunda-feira, 08. Agosto, 2011, 14:00-19:00h**

- Welcome and introduction (course, speakers and participants)
- Introdução e caracterização do sistema planta/estação-emissário, legislação internacional atual, zona de mistura
- Descrição dos processos físicos no campo próximo
- Métodos de modelagem do sistema CORMIX: método integral, interações com contornos e margens, módulos adicionais
- Aplicações do modelo CORMIX: entrada e saída de dados, visualizações e interpretações

#### **Quarta-feira, 10. Agosto, 2011, 14:00-19:00h**

- Descrição dos processos físicos no campo afastado

- Aplicações do modelo CORMIX
- CorTime - Acoplamento com Delft3D-Flow
- CorHyd - Hidráulica interna de difusores
- Módulos adicionais: CorJet, CorSens

**Sexta-feira, 12. Agosto, 2011, 14:00-19:00h**

- Estudos de caso
- Módulos adicionais

**Referencias**

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