

2015 Regional Paper Contest Winners

[Guilherme Roberto Tonin](#) and [Denis José Schiozer](#)

Introduction

Three UNICAMP students were awarded with the first prize in the 2015 SPE Latin American and Caribbean Regional Student Paper Contest in three divisions - Undergraduate, MSc and PhD. The event was held within the ninth edition of the Brazil Offshore 2015 in Macaé, Rio de Janeiro, Brazil, on June 22nd and 23rd, 2015. The contest was open to undergraduate and graduate level students attending universities in the South America and the Caribbean region. Prizes were awarded during the conference to the top three papers in each division.

The winners, UNISIM/UNICAMP students, were:

- Undergraduate Division: Victor Rodrigues Alves. "*Use of individual well indicators on the optimization of production strategies*". Advisors: Denis José Schiozer and Ana Teresa Ferreira da Silva Gaspar.
- MSc Division: Lívia Moraes Marques. "*The fiscal system influence on oil fields development and government participation*". Advisors: Ana Teresa Ferreira da Silva Gaspar and Denis José Schiozer.
- PhD Division: Carla Janaina Ferreira. "*A probabilistic approach to quantify the value of information of 4D seismic projects*". Advisor: Denis José Schiozer.

We would like to congratulate the students for their achievement on being awarded the 1st place in all categories.

Those who place first at the regional contest are qualified to compete on the next round of the international student paper contest at the SPE Annual Technical Conference and Exhibition (ATCE) to be held in Houston, Texas, USA, 28-30 September 2015, where they will present their work at the SPE International Student Paper Contest.

Below, we present a summary of each of the winning entries in the 2015 Paper Contest.

Use of individual well indicators on the optimization of production strategies

(Victor Rodrigues Alves)

Large reservoirs, such as the fields in the Brazilian Pre-salt, require the generation of large mesh models increasing the simulation time so that the production strategy selection process can be very time consuming. Therefore, typical optimization procedures used in this process may need to be simplified. A possible way to reduce the computational time is to use a new hybrid process. It consists of an assisted methodology that uses indicators based on the reservoir engineering knowledge increasing the accuracy of the alterations to be performed,

speeding up the process. In this work, the alterations are made based on economic and production indicators of each individual well: net present value, oil, water and gas cumulative productions and oil flow rates. The indicators are classified as low, medium or high according to the mean reservoir value. Their combination ranks the well in one of four different regions allowing the identification of wells with high priority for alteration. Neighbor wells in the same area of influence are not modified in the same iteration. The indicators analysis points the causes of low well performance enabling the user to make alterations aiming to solve them. Different suggestions of possible procedures to be adopted to improve the performance of the well and consequently the field are provided according to each well location in a region. The methodology was applied to a strategy previously optimized for UNISIM-I-D case based on the Namorado Field, Campos Basin, Brazil. Results show that the refinement step is very useful to increase NPV and to give reliability to the selected strategies. The methodology has shown to be an excellent way to apply accurate alterations in production strategies. Besides, it is a very efficient tool to measure how well optimized a strategy is and if still there is potential for improvements.

The fiscal system influence on oil fields development and government participation

(Lívia Moraes Marques)

In 2010, the Brazilian government changed its regulatory framework for the exploration and production of the pre-salt reserves, located in the Campos and Santos basins, from royalty and tax (R&T) system to a production-sharing contract (PSC) system to increase the government take (GT). When defining an oil or natural gas reservoir production strategy, not only all available reservoir characteristics and economic scenarios must be considered, but also the fiscal system involved. Previous works have shown that, in more optimistic economic scenarios, the optimal recovery strategy presents low dependency on fiscal systems. This work aims to evaluate the fiscal system dependency on oil field development under different economic scenarios to verify if that behavior continues. Two different reservoir models were submitted to the production strategy selection process for both fiscal systems in four economic scenarios. The results were compared using technical and economic evaluation indicators. Considering the development and production strategy based on the company objective-function - net present value (NPV), results showed that the fiscal system influences the strategy and level of investments, mainly in pessimistic economic scenarios, where fewer

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investments reduce the government return compared to the former tax system. The PSC was designed aiming to generate higher government participations. Results suggest that, in fact, the GT of the optimized strategies for PSC are superior to the results from R&T. However, this is not a pattern when analyzed from the viewpoint of government revenues (GR). Reservoir models with high volumes of original oil in place (OOIP) generate higher total revenue (TR) when developed under R&T, leading to higher revenues for both the company and the government. Results indicate the importance of analyzing the government participations with care when interpreting both indicators and the influence of the fiscal system when selecting a production strategy under more pessimistic economic scenarios.

A probabilistic approach to quantify the value of information of 4D seismic projects

(Carla Janaina Ferreira)

A challenge that managers face is to make decisions to maximize the project's return in the face of uncertainty. Acquisition of new information can assist decision makers in the reservoir management process. However, the acquisition of new information is not cost free and a routine business decision to be faced is whether acquiring new information is worthwhile. Consequently, the valuation of information becomes a significant part of a reservoir management process. The value of information (VOI) concept is commonly used to quantify the economic benefit resulted from the new information. The quantification of the VOI after the acquisition of information is simpler. In contrast, the VOI estimation before the acquisition of information is more complex because of the number of uncertainties and difficulties to model the problem; the term Expected Value of Information (EVOI) should be used in such context. The EVOI is based on average expectations; it is a weighted measure and does not show the variation of the expected benefits owing to reservoir uncertainties and consequently does not provide a complete picture of the problem. Thus, it is proposed a methodology that provides information about the possible range of outcomes increase and their probability. The methodology employs the chance of success (COS) concept, which provides more complete results. It applies the uncertainty analysis technique to generate multiple reservoir models, from which the fluid behavior es-

tablishes the period to acquire 4D seismic data. Through the use of the representative models technique it is possible to select the models that represent the reservoir geological and economic variability. Finally, the impact of 4D seismic data on each representative model is quantified. The present study describes the methodology to estimate the COS, applies it to a synthetic model to validate the results and shows its benefits, as well as compares the EVOI and COS results obtained. The COS better supports the decision-making process due to its probabilistic approach. The decision maker can more meaningfully frame the range of potential increased returns and to validate this against the organization's tolerance level. Such procedure makes the methodology an important tool for reservoir management.



Victor Rodrigues Alves - 1st place in Undergraduated Division

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Livia Moraes Marques (left) - 1st place in Master Division and Carla Janaína Ferreira (right) - 1st place in PhD Division

About authors:

Guilherme Roberto Tonin is collaborator UNISIM and works in the administrative area.

Denis José Schiozer is professor at Petroleum Engineering Division, Energy Department, School of Mechanical Engineering of UNICAMP, director of the Center for Petroleum Studies (CEPETRO) and coordinator of UNISIM.



Research in Reservoir Simulation and Management Group

Petroleum Engineering Division - Energy Department
School Of Mechanical Engineering
Center for Petroleum Studies
University of Campinas
Campinas - SP

Phone.: 55-19-3521-1220

Fax: 55-19-3289-4916

unisim@dep.fem.unicamp.br

For further information, please visit
<http://www.unisim.cepetro.unicamp.br>

The UNISIM Research Group is part of UNICAMP (Petroleum Engineering Division, Energy Department, School of Mechanical Engineering, Center for Petroleum Studies) that aims to develop Works and projects in the simulation and reservoir management area.