

## CURRICULUM VITAE

### I. PERSONAL INFORMATION

**NAME** : Miguel Andrés Maldonado Saavedra.

**NATIONALITY** : Chilean

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**CURRENT POSITION** : Research Associate  
Department of Metallurgical Engineering.  
University of Santiago, Chile

### II. EDUCATION

**2010-2012** : Postdoctoral Fellow (Mineral Processing)  
Department of Mining and Materials Engineering.  
McGill University, Montreal, Canada  
Research: Optimization of flotation banks, Modeling single bubble shape-velocity relationship.

**2006-2010** : Doctor of Philosophy (Ph.D), Electrical Engineering.  
Université Laval. Quebec City, Canada.  
Thesis: “Advances in Estimation and Control for Flotation Columns”.

**2006** : Master of Science (MSc), Electrical Engineering.  
University of Concepcion. Concepcion, Chile.  
Thesis: “Modelación y Control Óptimo de una Línea de Flotación Rougher en Minera Los Pelambres”.

**2003** : Electronic Civil Engineering (BEng).  
University of Concepcion. Concepcion, Chile.

Thesis: “Modelación Dinámica y Control Predictivo con Restricciones para un Circuito de Molienda de Minerales”.

### III. PUBLICATIONS

#### **Chapters/sections in book:**

1. A. Desbiens, R. Del Villar, M. Maldonado and J. Bouchard Chapter 6. “Automatic control of flotation columns”. In book: "Advanced control and supervision of mineral processing plants". R. del Villar and D. Sbarbaro, Editors, Springer Verlag.
2. M. Maldonado. Section: Automatic Control in Mineral Processing. In book: “Will’s Mineral Processing Technology”. To appear in the 8<sup>th</sup> Ed. Barry Wills, James A. Finch (Ed).

#### **Articles in Journals:**

1. **M. Maldonado**, D. Sbarbaro, and E. Lizama. “Optimal Control of a Rougher Flotation Process based on Dynamic Programming”. Minerals Engineering, 20, pp. 221-231, 2007, (ISI).
2. **M. Maldonado**, A. Desbiens, and R. Del Villar. “An update on the estimation of the froth depth using conductivity measurements”. Minerals Engineering, 21(2008), pp. 935-939, (ISI).
3. **M. Maldonado**, A. Desbiens, R. Del Villar and J. Chirinos. “On-line estimation of bias rate using conductivity measurements”. Minerals Engineering, 21 (2008), pp. 851-855, (ISI).
4. **M. Maldonado**, A. Desbiens, R. Del Villar, “Decentralized control of a pilot flotation column: A 3x3 system”. Canadian Metallurgical Quarterly, Vol. 47, No. 4, pp. 377-386, 2008, (ISI).
5. **M. Maldonado**, A. Desbiens, R. Del Villar, “Potential use of model predictive control for optimizing the column flotation process”. International Journal of Mineral Processing, Vol. 93, 1, pp. 26-33, 2009, (ISI).
6. **M. Maldonado**, A. Desbiens, R. del Villar and R. Aguilera. “On-line estimation of frother concentration in flotation processes”, Canadian Metallurgical Quarterly. Vol. 49, No.4, pp. 435-446, 2010, (ISI).
7. A. Desbiens, R. del Villar, **M. Maldonado**, J. Bouchard. “Towards the optimization of flotation column operation”. CIM Journal, Vol. 2, No. 2, 2011, (ISI).

8. **M. Maldonado**, R. Araya, J. Finch. "Optimizing flotation bank performance using a flat cell-by-cell recovery profile". Vol. 24, Issue 8, 2011, pp. 939-943, (ISI).
9. R. Araya, **M. Maldonado**, C. Gomez, J. Finch. "Technique to automate measurement of water overflow rate in frother characterization testing ". Minerals Engineering, Vol. 24, Issue 8, 2011, pp. 950-952, (ISI).
10. **M. Maldonado**, R. Araya, J. Finch. "An overview of optimizing strategies for flotation banks". Minerals Journal, 2012, 2, pp. 258-271.
11. **M. Maldonado**, J. Quinn, C. Gomez, J. Finch. "An experimental study examining the relationship between bubble shape and rise velocity", Chemical Engineering Science, 2013, 98, pp. 7-11, (ISI).
12. J. Quinn, **M. Maldonado**, C.O. Gomez, J. Finch. "Experimental study on the shapevelocity relationship of an ellipsoidal bubble in inorganic salt solutions". Minerals Engineering, Vol. 55, January, 2014, pp. 5-10, (ISI).
13. R. Araya, **M. Maldonado**, C.O. Gomez, J.A. Finch. "Measuring gas dispersion parameters: selection of sampling points". Minerals Engineering, 65, pp. 172-177, 2014, (ISI).
14. A. Riquelme, A. Desbiens, R. del Villar, **M. Maldonado**. "A device for measuring conductivity of dispersions". Measurement, 53, pp.49-55, 2014, (ISI).
15. **M. Maldonado**, A. Desbiens, E. Poulin, R. del Villar, A. Riquelme. "Automatic Control of bubble size in a laboratory flotation column". International Journal of Mineral Processing, 2015, accepted for publication, (ISI).
16. F. Seguel, I. Soto, N. Kromenacker, **M. Maldonado**, N. Becerra-Yoma. "Optimizing flotation bank performance through froth depth profiling: revisited". Minerals Engineering, 77, pp. 179-184, 2015, (ISI)

### **Conferences:**

1. **M. Maldonado**, D. Sbarbaro, and F. Concha. "Constrained Model Predictive Control of a Wet Grinding Circuit". 11<sup>th</sup> IFAC Symposium on Automation in Mining, Mineral and Metal Processing, Nancy, France, 2004.
2. **M. Maldonado**, A. Desbiens and R. del Villar. "Decentralized Control of a Pilot Flotation Column: A 3x3 System". On the proceeding of the Copper'07, R. del Villar, C.O. Gomez, J.N. Nasset and A.W. Stradling, Eds., Toronto, Canada, 2007, pp. 241-254

3. **M. Maldonado**, A. Desbiens, R. del Villar and R. Quispe. "Towards the optimization of flotation columns using predictive control". 12<sup>th</sup> IFAC Symposium on Automation in Mining, Mineral and Metal Processing, Quebec City, Canada, 2007. pp 75-90.
4. **M. Maldonado**, A. Desbiens and R. del Villar. "An update on the estimation of the froth depth using conductivity measurements". Minerals Engineering International (MEI) Flotation'07, Cape Town, South-Africa, 2007.
5. **M. Maldonado**, A. Desbiens, R. del Villar and J. Chirinos. "On-line bias estimation using conductivity measurements". Minerals Engineering International (MEI) Flotation'07, Cape Town, South-Africa, 2007.
6. D. Sbarbaro, **M. Maldonado** and A. Cipriano. "A Two Level Hierarchical Control Structure for Optimizing a Rougher Flotation Circuit". 17<sup>th</sup> IFAC World Congress, Seoul, Korea, July 6-11, 2008.
7. **M. Maldonado**, A. Desbiens, R. Del Villar, E. Girgin and C. Gomez. "On-line estimation of bubble size distributions using Gaussian mixture models". On the proceedings of the V International Mineral Processing Seminar, Procemin, R.Kuyvenhoven, C. Gomez and A. Casali, Eds., Santiago, Chile, October 22-24, 2008, pp. 389-398.
8. **M. Maldonado**, A. Desbiens, R. del Villar and R. Aguilera. "On-line estimation of frother concentration in flotation processes" COM 09, Sudbury, Canada.
9. A. Desbiens, R. del Villar, **M. Maldonado** and J. Bouchard "Toward the column flotation optimization" COM 09, Sudbury, Canada.
10. **M. Maldonado**, A. Desbiens, R. del Villar, E. Poulin, A. Riquelme. "Control of bubble size in a laboratory flotation column". Copper 2010. Hamburg, Germany.
11. **M. Maldonado**., A. Desbiens, R. del Villar, E. Poulin et A. Riquelme. "Nonlinear Control of Bubble Size in a Laboratory Flotation Column". 13th Symposium on Automation in Mining, Mineral and Metal Processing, Cape Town, South Africa, pp. 3338, 2010.
12. C.O. Gomez, **M. Maldonado**, A. Araya, J. Finch. "Frother and viscosity effects on bubble shape and terminal velocity". COM 2010, Vancouver, 2010.
13. **M. Maldonado**, R. Araya, J. Finch. "An overview of optimizing strategies for flotation banks". Proceedings of the Canadian Mineral Processors, Ottawa, Canada, 2012.
14. **M. Maldonado**, R. Araya, J. Finch. "An overview of optimizing strategies for flotation banks". To be presented at the XXVI International Mineral Processing Conference (IMPC) New Delhi, India, Sept. 24-28, 2012.

15. Blonde, P., Singh. N., **Maldonado, M.**, Finch, J.A. “Recovery profiling in a talc flotation roughing bank”. 23<sup>rd</sup> World Mining Congress, Montreal, Canada, August 11-15, 2013.
16. C.O. Gomez, J.A. Finch, **M. Maldonado**. “Modelling bubble hydrodynamics in flotation”. In Proceedings of the International Copper Conference, Vol. II, pp. 3-16, December 1-4, 2013, Santiago, Chile.

#### **IV. RESEARCH GRANTS**

1. CONICYT FONDEF Project CA13I10320. “Development of an on-line measuring system for the collection zone gas holdup in flotation devices”. Ciencia aplicada. Position: Adjunct Director, 2013-In Progress.
2. CONICYT FONDECYT Initiation into Research Project 11130173. “Flotation bank optimization by recovery profiling”, 2013-In Progress, Position: Principal Investigator.
3. CONICYT PIA Project ACT1120. “Center for Multidisciplinary Research on Signal Processing”, Position: Researcher, 2013-In Progress.

#### **V. LANGUAGES**

English (fluent), French (fluent)

#### **VI. RESEARCH INTERESTS**

- Modelling, control and optimization of metallurgical processes.
- Development of real time on-line sensors for measuring gas dispersion properties in flotation systems.