Approved by the Regents
May 17, 2007

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Aline J. Cotel, assistant professor of civil and environmental engineering, Department of Civil and Environmental Engineering, College of Engineering, is recommended for promotion to associate professor of civil and environmental engineering, with tenure, Department of Civil and Environmental Engineering, College of Engineering.

Academic Degrees:

Ph.D.	1995	University of Washington, Aeronautics and Astronautics, Seattle, WA
M.S.	1992	University of Washington, Aeronautics and Astronautics, Seattle, WA
B.S.	1991	Ecole Polytechnique Feminine, Aeronautical Engineering, France

Professional Record:

1999 - present	Assistant Professor, Department of Civil and Environmental Engineering, University of Michigan
1996 -1999	Assistant Professor, Department of Mechanical and Industrial Engineering, University of Manitoba
1995 - 1996	Postdoctoral Fellow, Fluids Dynamics Division, Battelle Pacific Northwest National Laboratory

Summary of Evaluation:

Teaching: Professor Cotel is an extremely dedicated teacher and has demonstrated that she is an effective instructor and mentor to students both within the classroom and while working with them outside of the classroom. Since joining the CEE faculty, Professor Cotel has taught four different courses; she introduced a graduate course in her research area, environmental turbulence and is also responsible for a required undergraduate course in fluid mechanics, as well as a second graduate course in environmental analysis. Professor Cotel has introduced a significant hands-on component to her courses greatly improving student understanding of the material through creative problem solving. Her teaching evaluations have been strong for all courses and are particularly impressive in the required undergraduate lecture, achieving an average of 4.14 and 4.52 for Q1 and Q2. These numbers indicate a high level of ability, preparation, and devotion to her teaching responsibilities. Her achievements as a teacher were recognized in 2001 when she was chosen for the "Excellence in Teaching Award" for the Great Lakes District of Chi Epsilon. Professor Cotel also has a strong record of involving students at all levels, from Ph.D. to high school, in her research program. Students who have undertaken research with her consistently describe her as a valuable mentor. Professor Cotel has graduated one Ph.D. student and served on nine Ph.D. committees. She currently has three Ph.D. students, one nearing graduation.

Research: Professor Cotel has made prominent and lasting contributions to the field of theoretical and experimental fluid dynamics by improving our understanding of vortex behavior and entrainment at stratified interfaces. Her most notable contributions include the establishment of a new dimensionless number, the vorticity persistence parameter, to characterize mixing in stratified flows, the development of invaluable experimental data sets of gravity currents that help to validate dynamic models of turbulent flows, and her most recent fundamental correlations between turbulence structure and fish habitat choices. The external reviewers uniformly characterized her work as fundamentally sound and of very high quality. Her publications have been and continue to appear in high quality journals. Most of Professor

Cotel's research is experimental in nature, and many external reviewers offered high praise for her acumen as an experimentalist, attaching a high value to her experimental data.

Professor Cotel's new lines of research in biological fluid dynamics, which focus on the effects of turbulence on fish habitat choices and shoreline environments, generated enthusiastic praise from external reviewers. The reviewers uniformly believe that her work in this area is innovative and will make her significantly more visible in the profession. She also received the prestigious NSF Career Award in 2005. Her research productivity over the past year, especially in terms of the number of journal publications, external research funding, and invited presentations, have all significantly improved. There was unanimous agreement among the external reviewers based on her more recent productivity, the serious personal challenges that she faced early in her time at Michigan, and the very promising direction of her new research, that she should be promoted to associate professor with tenure.

Recent and Significant Publications:

Samothrakis, P. and Cotel, A.J., "Finite volume gravity current impinging on a stratified interface", *Experiments in Fluids*, 41:6, 991-1003, doi: 10.1007/s00348-006-0222-x, December, 2006.

Cotel, A.J., Webb, P. and Tritico, H. "Do trout choose habitats with reduced turbulence?" *Transactions of the American Fisheries Society*, 115, 610-619, 2006.

Samothrakis, P. and Cotel, A.J. "The dynamics of a gravity current impinging on a stratified interface," *Journal of Geophysical Research*, 111, C01012, doi:10.1029/2005JC003125, 2006.

Cotel, A.J., Golingo, R., Oakes, J.E., and Riewe, R.R. "Analysis of heat transfer in ancient Inuit fur parka ruffs," *Journal of Climate Research*, 26, 77-84, 2004.

Cotel, A.J. "Turbulence inside a vortex – Take two", *Physics of Fluids*, 14(8), 2933-2934, 2002.

Zhang, Q. and Cotel, A.J. "Entrainment of a thermal with and without buoyancy reversal impinging on a stratified interface," *Journal of Geophysical Research*, 105(D12), 15457-15467, 2000.

Cotel, A.J. and Breidenthal, R.E. "Turbulence inside a vortex", *Physics of Fluids*, 11(10), 3026-3029, 1999.

Cotel, A.J. "A trigger mechanism for the Lake Nyos disaster", *Journal of Volcanology and Geothermal Research*, 88, 343-347, 1999.

Cotel, A.J., Gjestvang, J.A., Ramkhelawan, N.N. and Breidenthal, R.E. "Laboratory experiments of a jet impinging on a stratified interface", *Experiments in Fluids*, 23(2), 155-160, 1997.

Cotel, A.J. and Breidenthal, R.E. "Jet detrainment at a stratified interface", *Journal of Geophysical Research*, 102(D20), 23813-23818, 1997.

Cotel, A.J. and Breidenthal, R.E., "A model of vortex persistence effects in stratified entrainment", *Applied Scientific Research*, 57, 349-366, 1997.

Service: Professor Cotel's service to the University and the engineering profession is impressive for a junior faculty member. Her more notable professional service includes serving as a session chair at three national annual meetings of the American Physical Society (APS), as well as a session chair at an international symposium, and as a frequent panel reviewer for the Air Force and NSF. In addition, she was recently selected to be a member of APS's National Publications Committee, Fluid Dynamics Division. She has played an especially important service role to the University by hosting several local seminars, including the Midwest Mechanics seminar series, the Geophysical and Environmental Fluid Dynamics seminar series (which she founded), and the C.S. Yih Symposium. In addition, she has been a member of a two awards selection committees and the University Mentorship Program. At the College level, Professor Cotel served on the search committee for a new CEE Department Chair in 2001, and as an external member for another four searches in a wider variety of disciplines. In the CEE Department, she served as a member of the Safety and Research Committees and as the CEE liaison for Tech Day.

External Reviewers:

Reviewer (A): "...she is a bright, creative scientist who has a strong grasp of basic fluid mechanics. This fundamental disciplinary strength shows through in all her publications..."

Reviewer (B): "Her publications that I have read over the years were very thorough and of the highest quality.... The publications resulting from her Ph.D. thesis with Prof. Breidenthal on turbulent entrainment in stratified flows have had significant impact."

Reviewer (C): "...her recent work is very much focussed [sic] on applying novel thinking to new problems, in particular to the fish habitat work. This is creative and interesting, and she brings a quantitative approach to an interdisciplinary area..."

Reviewer (D): "If I see Aline Cotel's name on a talk at a conference with multiple sessions, I will make every effort to attend her talk. It will be original, well-informed, clearly delivered, and there will be progress."

Reviewer (E): "...I am particularly impressed by her conceptualization of vortex persistence as a key parameter in describing entrainment at density interfaces....I have used it to interpret observations of mass exchange between canopies and adjacent open water."

Reviewer (F): "Her recent work on gravity currents is very significant as it has not only yielded new insights into the physics of such flows but also contributed to the literature high quality experimental data sets that can be used to validate computational dynamics models."

Summary of Recommendation: Professor Cotel has proven she has strong and well-balanced leadership capabilities in teaching, research, and service. She has established herself as a leader in environmental fluid mechanics and has positioned herself well within a strategic area of research. Her research has been published in prestigious refereed journals and she has procured a healthy level of research funding. She is a dedicated teacher and student mentor who has given selflessly to the University's educational and service missions. It is with the support of the College of Engineering Executive Committee that I recommend Aline J. Cotel for promotion to associate professor of civil and environmental engineering, with tenure, Department of Civil and Environmental Engineering, College of Engineering.

David C. Munson Jr.

David C. Munson, Jr.
Robert J. Vlasic Dean of Engineering
College of Engineering

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