

ANNUAL REPORT EVALUATION – 2007
CENTRE FOR MATHEMATICAL MODELING

Reviewer 1:

This document is an evaluation of the 2007 Annual Report submitted by the FONDAP Centre for Mathematical Modeling (CMM).

The report demonstrates the Centre's outstanding performance in every respect. As stated in the previous evaluation, the Centre for Mathematical Modeling is one of the world's most successful research centers in applied mathematics. This achievement is largely due to the ongoing outstanding leadership of the CMM and the high quality of the efforts of the participants.

The Center is organized around six areas: (1) discrete mathematics, (2) mathematical mechanics, (3) nonlinear analysis –PDE, (4) numerical analysis, (5) optimization, and (6) stochastic modeling. The members of these groups are extremely productive in research and interact with other scientists and engineers from a broad spectrum of fields, many of which represent areas of great opportunity and promise for collaboration and national/international impact. The CMM also plays an important role in the education and training of the next generation of researchers and in the development of new tools for the improvement of the Chilean educational system.

There are a number of indicators that support the conclusion that the CMM is contributing greatly to the scientific enterprise in Chile and in the wider scientific community. From the time of the Centre's creation through the current reporting period, CMM researchers and collaborators have published numerous papers in prestigious international journals. In particular, during 2006, 99 articles by CMM researchers appeared and in 2007, 73 articles appeared or were accepted. Also during the reporting period, 6 international congresses were organized and 162 weekly seminars in thematic and applied areas were held. Eight conferences and workshops were organized and financed (at least partially) by CMM during this period. Most of these had a strong international presence. In addition, 4 patents were in process and one was awarded.

CMM continues to have a strong international presence. More than 80% of the papers produced at the center are in collaboration with researchers outside Chile, preponderantly from France, the rest of Europe, Latin America, the United States, and Canada, as well as new collaborations with China. Each year, around 10 new postdocs arrive from all over the world. In addition to already being a member of the Centre Nationale de Recherches Scientifiques (CNRS) of France, CMM belongs to an international network of centers including MITACS and CIRRELTs (Canada), PIMS (Canada-USA), MATHEON (Germany), MASCOS (Australia), and Paris VI (France). It also maintains strong links to IMPA and USP in Brazil. CMM co-founded PRIMA, a

group of Pacific Ring mathematics participants and signed a collaboration agreement with IMCA (Peru). CMM also actively participates in two international grid computing networks, PRAGMA and GELATO. The above is only a partial list of the CMM's international linkages.

The annual report included material on the progress and activities of the following CMM research areas that involve collaborations with industrial or government entities: (1) Mining, (2) Energy and Telecommunications, (3) Forestry, and (4) Environment. These projects represent a wide array of applications that in turn require a broad spectrum of mathematical ideas and tools in order to make progress on the problems to be addressed and solved. Many of them involve problems in important sectors of the Chilean economy and involve collaborations with industrial partners and governmental units. The projects were carefully chosen to match the available expertise of the CMM members and collaborators, and have either been successful or have a large chance of successful progress. CMM also has a strong educational mission in the teaching and learning of mathematics, including involvement in teacher preparation and enhancement projects, curriculum and materials development, and textbook evaluation.

Finally, the CMM plays a significant role in the development of the next generation of researchers: during the reporting period, it hosted 11 postdoctoral fellows, 48 Ph.D. students, and 16 engineering masters students. A significant fraction of these students completed their degrees during this period.

In summary, the CMM continues to maintain the highest standards of excellence in research, outreach, and education. I strongly recommend accepting this report in its present form, as I believe that the CMM is fully addressing its goals and objectives as well as the issues covered by the report. Significant progress in all areas of its operation is being made --- the Centre continues to evolve and enlarge its outreach and mission in highly productive directions. In my opinion, the positive comments included in the most recent visit of the review committee are still operative. In short, this Centre is an outstanding contributor to the excellence of Chilean science and engineering.

ANNUAL REPORT EVALUATION
CENTER FOR MATHEMATICAL MODELING (CMM)
APRIL 2006–AUGUST 2007

Reviewer 2:

This is my evaluation of the scientific report of the CMM for the period from April 2006 to August 2007. In writing this, I have been aided by access to the evaluations for 2005–2006 and to the summary of the proposal for the second five-year period of the CMM.

The CMM is an outstanding activity. It aims: to develop theory and applications in applied mathematics; to develop links to practitioners; to contribute to mathematical education.

There is strong evidence that it has achieved, and will continue to achieve, high levels of success with these objectives.

The primary evidence in question is the substantial number of research articles published or due to be published by members and associates of the CMM in journals with strong international reputations. There are healthy visitor and seminar programmes. Of especial importance is the development of international collaborations and connections with related communities especially (but not only) in France, Germany, and Pacific rim countries.

The training of the next generation of researchers is a vital part of the activities of the CMM, and this is pursued through healthy PhD and postdoctoral programmes.

The CMM has a number of areas of concentration. These areas are recognised worldwide as being of current importance for applications, and the work reported under these headings is generally of international visibility. I shall not report in detail on each area. In brief, the quality and the quantity of publications are high, across all the domains of the CMM.

The involvement of the CMM in mathematics education is exciting and timely, at a time when the level of scientific education in schools in many countries is threatened by the difficulty of recruitment of teachers with the required background in mathematics and the sciences. Activity in matters of school education is usually best conducted in collaboration with appropriate experts. It would be helpful if the next report might include details of such collaborations.

On governance, there is an international committee, and a CMM advisory committee. These are very much to be welcomed. There are plans for an industrial advisory board, and progress is presumably expected on this. The CMM has recently appointed a new Director, with help from its international committee.

There are signs of healthy integration between the different elements of the Center, through the cross-participation of individuals across the different domains. This is very important for the success of the program, and I suggest that such integration be systematised in the next report.

Many of the applications detailed in the report, including those in the biological sciences, require the ability to analyse data. Where does this take place? Are there statisticians associated with the CMM?

The report is a snapshot of the past year's activities. The health of the CMM is reflected in part through its plans for the future, and I recommend that the Director consider adding a section on future plans to the next report.

The CMM is a highly meritorious organisation, with substantial levels of distinction and achievement. It continues to make an enormous and distinctive contribution to Chilean and world science. My summary recommendation is to accept the report in its present form. On the nine detailed points of evaluation, I judge in every case that the progress is total/good.