DEPARTMENT/PROGRAM REPORT: PROGRESS TOWARD TENURE AND REAPPOINTMENT

Faculty Member____H. Sanjeeva Balasuriya_____

Department/Program____Mathematics_____

Current Rank____Visiting Assistant Professor_____ **Date** ___9/21/01_____

This report will also be used by the College Faculty Council as the basis of the faculty member's progress toward tenure review for this academic year.

1. **Please evaluate the person's effectiveness as a teacher during the course of his or her Oberlin appointment. Note in particular both strengths and weaknesses in the following categories: competence in subject matter taught; skill in presentation of subject matter; effectiveness in stimulating students to learn; pedagogical innovations; and standard of student work demanded. Please cite specific evidence.**

During the first year of his appointment Sanji taught four courses, two sections of calculus I (MATH 133), a section of calculus II (MATH 134), and a QP course (MATH 030). All of these courses went well, as evidenced by the comments students wrote on course evaluations and the strong numerical ratings students gave to the courses. Simply put, Sanji got off to a very good start in the fall of his first year and then did an even better job in the spring.

In the fall, the majority of students in Sanji's two sections of 133 praised both his performance in the classroom and in office hours. Regarding his lectures, students said "Sanji's lectures were very structured, easy to understand, and extremely thorough" and that they were "filled with energy and very well organized and focused." Students noted that the "instructor seemed to spend much time in preparation" and said that he gave "wonderful lectures." Students were also very happy with Sanji's office hours, saying that "Sanji was accessible well beyond the required office hours and was incredibly helpful and patient" and that he was "very accessible." There were some students who complained that the lectures "mirrored the book," but these comments were not numerous.

Students in the spring were even more positive in their assessment of Sanji's teaching. Students in 134 said things such as "Energetic enthusiastic instructor," and "Sanji allowed us to have fun in class; often I enjoyed this class the most of any of mine -- how often do people say that about Calc II?" They found him to be "Very accessible, helpful, and patient." Sanji's helpfulness in office hours can be summarized in the words of one student, who wrote "Even when he didn't have office hours, he would make time to see me, and he would always work with me till he felt I understood." We note that the comments about the lectures mirroring the book disappeared in the spring.

Sanji also taught a Quantitative Proficiency course (MATH 030 -- Topics in Contemporary Mathematics). This is a difficult teaching assignment, particularly for a new teacher. Sanji met the challenge with complete dedication and a great deal of hard work. Judging from student reaction, these efforts paid off. Here are a few quotes from Math 030 student evaluations:

"Sanji is a wonderful instructor, very engaged in the material and interested in the students."

"Sanji is a great prof. I hope he stays at Oberlin."

"Yea Sanji! I love this guy! He's a great math teacher."

The numerical ratings Sanji earned were very good for a beginning teacher at Oberlin, varying from 3.8 and 4.3 (out of 5) in the Math 133 sections in the fall to 4.3 in MATH 030 and a very impressive 4.7 in Math 134 in the spring. Overall, we find that Sanji got off to an excellent start teaching at Oberlin.

2. Please evaluate the person's achievements in scholarship and/or other creative activities (e.g., publications, exhibitions, performances) during his or her Oberlin appointment, noting in particular both strengths and weaknesses, and assessing the importance, originality, and contribution of the work to the field. Provide an assessment of the quality of the journals (including, whether they are refereed), presses, or other outlets for the work.

Sanji had a good year at Oberlin, continuing the research program that he had begun earlier. He had two applied mathematics papers accepted by the (refereed) journal *Nonlinear Processes in Geophysics*. The first paper uses partial differential equations to model potential vorticity flow, which measures a type of energy. The transport of temperature, salinity, etc., is linked intimately to the transport of potential vorticity in the ocean. Sanji's study analyzes potential vorticity transport based on the partial differential equation that it must satisfy. For the non-diffusive equation, certain qualitative properties are presented. Since non-diffusive (potential vorticity conserving) models are frequently used in modelling oceanic flows, these results tell which observed features are NOT well described through such models.

Sanji's second paper (co-authored with C.K.R.T. Jones) uses an analytical result derived in a previously published paper (Balasuriya, S., Jones, C.K.R.T. and Sandstede, B., Viscous perturbation of vorticity conserving flows and separatrix splitting, *Nonlinearity* 11, 47-77, 1998), to attempt to determine qualitative (mainly geometric) conditions on an eddy in the ocean that would enhance its chances of survival in the presence of diffusivity. The paper uses very technical mathematics (Melnikov theory, Lyapunov-Schmidt reductions, the Sobolev Embedding Theorem, etc.). Nonetheless, it is written for an oceanographic audience, simply analyzing the previously published result (while providing some intuition into it) to determine physically observable conditions. Specifically, eddies that are qualitatively more inclined to survive are those which (i) are large (more precisely, have large radii of curvature), (ii) have acute pinch angle (when pinching off from the Gulf Steam, for example), (iii) have more tightly packed potential vorticity contours just inside the eddy in comparison to outside, and (iv) are subject to a wind forcing whose magnitude increases in the northward direction. This is one of very few papers that use theoretical mathematics to obtain physically relevant conditions.

In addition to his writing, Sanji gave three talks during the past year at conferences around the country.

3. Please evaluate the person's research and/or other creative activities in progress. Indicate, to the degree possible, the rate of progress as well as the quality of the work.

Sanji has two papers in preparation, in the same research area as those described above. We are very pleased with the research progress he is making.

4. Please evaluate this person's prospects of sustained scholarly and/or other creative contributions.

Given his devotion to his work and his considerable ability to produce research results, we have every reason to expect that Sanji will sustain his research program.

5. Please evaluate this person's professional contributions other than teaching, writing and/or other creative works (e.g., editing, consulting, service to the profession).

Sanji was an "expert reviewer" for the Physics Diagnostic Subject Test of the Massachusetts Comprehensive Assessment System in the fall of 2000.

6. Please evaluate this person's effectiveness in academic advising.

Sanji had no advisees in his first year.

7. Please evaluate this person's major services in the department or program.

Sanji was active in the day-to-day work of the Mathematics Department and delivered a very interesting a talk in the Department's colloquium series. He contributed, with considerable energy, to the development of a new 200-level course in applied mathematics and has also developed a new 300-level course in partial differential equations. The partial differential equations course is related to Sanji's field of research and builds on MATH 234 (Differential Equations). The audience for the course includes physics majors as well as mathematics majors, particularly those with an interest in applied mathematics. These are substantial contributions to the Department.

8. Please evaluate this person's other contributions to the College and/or community.

Sanji had no College committee assignments in his first year.

Summary: Sanji has done an outstanding job as a first-year Oberlin faculty member.