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Subject: Final report on the project AKTION 38p10, Low dimensional dynamical systems.

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Final report

The goal of this project is to conduct joint research in the field specified in the title. Toward this, in the year 2004 four mutual visits were funded by this project:

- 1) July 5 – 10, 2004 visit of Prof. Smítal to Vienna. During this visit there were selected two problems to be solved within the project.
- 2) October 25 – 29, 2004 working visit of Prof. Raith and Prof. Hofbauer at the Mathematical Institute of the Silesian University in Opava.
- 3) November 29 – December 3, 2004 working visit of Dr. Málek at the Faculty of Mathematics, University Vienna.
- 4) December 13 – 18, 2004 working visit of Prof. Smítal at the Faculty of Mathematics, University Vienna.

During the period July - December 2004 the partners started joint research concerning some aspects of dynamics of piecewise monotone and piecewise continuous maps of the interval. This research will terminate in joint papers which will be published later; the results obtained are not yet suitable for publication.

The main result of the first paper is the theorem that, for any map f of the interval which is both piecewise monotone and piecewise continuous, the system of omega-limit sets of f equipped with the Hausdorff metric, is a compact set. This essentially extends the main result of A. Blokh, A. M. Bruckner, P. Humke and J. Smítal [The space of omega-limit sets of a continuous map of the interval, Trans. Amer. Math. Soc. **148** (1996), 1357 – 1372] where a similar theorem is proved for continuous maps of the interval.

The second future paper deals with distributional chaos for piecewise monotone and piecewise continuous maps of the interval. It is very likely that a naturally modified

spectral decomposition theorem for such maps will be obtained. This would essentially extend the main result of B. Schweizer and J. Smítal [Measures of chaos and a spectral decomposition of dynamical systems on the interval, Trans. Amer. Math. Soc. **344** (1994), 737 – 854]. To prove this result we will apply techniques developed in F. Hofbauer [Piecewise invertible dynamical systems, Probab. Theory Related Fields **72** (1986), 359 – 386].

Moreover, the continuity of the omega-limit set has been investigated. In a recent preprint J. Smítal and T. H. Steele [Stability of dynamical structures under perturbation of the generating function, Opava, 2004] conditions equivalent to the continuity of the omega-limit set of a continuous map f on the interval are described. For unimodal maps other equivalent conditions can be given using methods from F. Hofbauer [The topological entropy of the transformation $f(x)=ax(1-x)$, Monatsh. Math. **90** (1980), 117 – 141]. A paper containing this result is in preparation, which may also present other interesting results on continuity of the omega-limit set in some special situations (however, this is not clear quite now).

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