

**ESF SHORT VISIT GRANT \*FINAL REPORT\*/OREN  
LOUDOR/29.7-5.8/BUDEJOVICE(CZECH)**

1. AIM OF VISIT

The aim of this visit was a continuation of the collaborative work on the project "The thinned extremal process of the discrete Gaussian Free Field", between myself and Prof. Marek Biskup (UCLA and University of South Bohemia, Budejovice, Czech Republic). This work has started May 2012. The grant supported travel from/to Israel and the cost of stay at Budejovice, Czech Republic, during 29/7 to 5/8.

2. WORK CARRIED OUT DURING VISIT

During the visit we worked on both the project mentioned above (henceforth "GFF") and another one - "Asymptotics for the Cheeger constant of the infinite cluster in Bernoulli Bond Percolation on  $\mathbb{Z}^2$ " (henceforth "Cheeger"). Progress has been made in both.

3. MAIN RESULTS OBTAINED

In the GFF project we have identified a major problem in the form of the non-existence of the intensity measure for the limiting point process, thereby rendering our previous derivation of ODEs for the density of the latter improper. Nevertheless, we believe that in a "formal" sense the solution to this system of ODEs does characterize the correct limiting point process and effort has been made to 1) derive ODEs for quantities other than the intensity densities, which do exist and still characterize the limit, or 2) characterize the limiting process by working directly with the main invariance relation, which (as we can prove) it satisfies. This is still work in progress and so far we cannot come up with a proper substitute for this essential part of the proof.

In the Cheeger project, much progress has been made and we have a substantial part of the proof worked out and written down. In particular, concentration of the minimal density of one-sided boundaries of open paths from the origin to a point along a given direction, which constitutes a major ingredient in the proof, was established, based on arguments by Kesten for first passage percolation.

4. FUTURE COLLABORATION

Both projects are still ongoing and worked on these days, by both myself and Prof. Marek Biskup, whether he is in UCLA or University of South Bohemia.

## 5. PROJECTED PUBLICATIONS

We strongly believe that the Cheeger project will be completed within a few months and thereafter submitted for publication. In the GFF project we hope to overcome the current shortcoming of the proof and be able to complete and submit the paper by the end of 2012.