Some Notes on the Discussions during Michal's visit in Graz

Günther Of

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- mpi parallelization by:
    - 1d temporal distribution taking care of causality
    - optimization tool (charm++) for distribution if successful for simpler examples

- Check if Grazer FMM version and bem4i are suitable for extracting some parts for FMM

- Graz will contribute FGT operations for the pFMM

- some ideas and tasks about adaptive pFMM:
    - Graz: FGT for different levels (which operation, error estimates) possible?
    - Graz: how does an (adaptive) admissibility condition look like?
    - build some local (not strictly binary) cluster tree and apply coarsening to create upper part of the binary tree (easily because of ordering of the intervals). possible advantage: less communication on lower levels. Ignoring the upper part of the tree will not give optimal complexity
    - cluster tree: alternating scheme (just temporal and temporal+spatial subdivisioning). The intermediate level should reduce the number of interactions. Graz: Is this scheme suitable for adaptive FGT?
    - communication: send multipole or local expansions (input or output of operations), but not a message per operation.
    - idea: use distribution of M2L operations for load balancing (we may test this in a sandbox for the FGT with two processes else parallelization in the full code), keep in mind several levels. The operations may be redistributed after a matrix vector multiplication.
    - Ostrava: possible GPU implementation by a student as an extra

- – An alternative view of the method: 4d FMM, but does not take into account causal structure and specific admissibility condition. Katzuki's test did not work for $(2+1)$d.

- Travel plans:
  - – Söllerhaus
  - – Honza: late in the year
  - – Michal: end of the year
  - – Raphael: in fall at short notice
  - – Günther: in September (not 16-20) or short visit in the winter term (decide before Aug 5)