**Open Thesis**

**Semi-groups of nonlinear contractions**

**Description:**

Let $H$ be a real Hilbert space endowed with inner product $\langle \cdot, \cdot \rangle$ and induced norm $\| \cdot \|$. A one parameter family $\{S(t) \mid t \geq 0\}$ of mappings from $H$ into $H$ forms a semi-group if

(i) $S(0) = \text{id}_H$,

(ii) $S(s + t)x = S(s)S(t)x$ for all $s, t \geq 0$ and $x \in H$.

A semi-group $\{S(t) \mid t \geq 0\}$ on $H$ is a semi-group of (nonlinear) contractions if, for any $t \geq 0$,

$\|S(t)x - S(t)y\| \leq \|x - y\|$, $x, y \in H$.

In this thesis project we investigate a semi-group of nonlinear contractions that is generated by a maximal monotone operator $A : H \to 2^H$. We say $A$ is maximal monotone if it is monotone, that is,

$\langle x - y, u - v \rangle \geq 0$, $(x, u), (y, v) \in \text{gra} A$,

and, in addition, its graph is not properly contained in the graph of any other monotone operator. The objective of the thesis project is the study of the asymptotic behavior of the semi-group of nonlinear contractions.

**Prerequisites:**

- Fundamentals of dynamical systems
- Lecture *Convex Optimization*

**Supervisor:**

**S. K. Niederländer**
Room 3.243

**Area:**

Dynamical systems; Convex optimization

**Properties:**

Type: MA

40% literature
60% theory

**Beginning:**

now

Further information: [www.ist.uni-stuttgart.de/lehre/bama](http://www.ist.uni-stuttgart.de/lehre/bama)

Notice from February 23, 2018