1139-35-581 **Emanuel Indrei*** (eindrei@purdue.edu). *The geometry of the free boundary near the fixed boundary generated by a fully nonlinear uniformly elliptic operator.*

The dynamics of how the free boundary intersects the fixed boundary has been the object of study in the classical dam problem which is a mathematical model describing the filtration of water through a porous medium split into a wet and dry part. By localizing around a point at the intersection of free and fixed boundary, one is led to the following problem

$$\begin{cases} F(D^2u) = \chi_\Omega & \text{in } B_1^+ \\ u = 0 & \text{on } B_1' \end{cases}$$

where $\Omega = \big(\{u \neq 0\} \cup \{\nabla u \neq 0\}\big) \cap \{x_n > 0\} \subset \mathbb{R}^n_+$, $B_1' = \{x_n = 0\} \cap \overline{B_1^+}$, and F is a C^1 fully nonlinear uniformly elliptic operator. In this context, the free boundary is $\Gamma = \mathbb{R}^n_+ \cap \partial\Omega$ and tangential touch means that for any $\epsilon > 0$ there exists $\rho_\epsilon > 0$ such that

$$\Gamma \cap B_{\rho_\epsilon}^+ \subset B_{\rho_\epsilon}^+ \setminus \mathcal{C}_\epsilon,$$

where $\mathcal{C}_\epsilon := \{x_n > \epsilon |x'|\}$, $x' = (x_1, \ldots, x_{n-1})$. Tangential touch for the Laplacian is well-understood and the more general case in two dimensions is joint work with Minne. This talk focuses on the problem in higher dimensions. (Received February 19, 2018)