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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 $\Omega = (\{u \neq 0\} \cup \{\nabla u \neq 0\}) \cap \{x_n > 0\} \subset \mathbb{R}_+^n$ and $B_1' = \{x_n = 0\} \cap \overline{B_1^+}$, 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 on a small enough scale, the free boundary is trapped below any cone with opening strictly less than π . 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 06, 2018)