Hydraulic fracturing technology for stimulation of oil and gas recovery has evolved over nearly seven decades. Most recently it has been credited with unlocking vast resources that were previously uneconomical to produce. In so doing, hydraulic fracturing has revolutionized the industry and become one of the most influential innovations of our current century. As a technology, it is an intriguing example of youthfulness and maturity. The maturity manifests in that every approach used today is tied to origins that are decades old, and so engineering and innovation must always be understood in historical context. The first part of the talk will provide this context through a brief historical tour of hydraulic fracturing technology. On the other hand, the youthfulness arises because recent advances have opened entirely new challenges, providing many opportunities for innovation. The second part the talk will focus on one of these topics that being addressed at the University of Pittsburgh. Modern hydraulic fracturing is often aimed at uniformly stimulating 5,000-10,000 feet of horizontally-drilled wellbore. This goal of uniform stimulation is, of course, never perfectly achieved. The problem is that the current approaches almost never even come close. In a typical horizontal well around 40% of the well is ineffectively stimulated and therefore completely unproductive. The presentation will illustrate how understanding of hydraulic fracturing mechanics, developed through the use of hydraulic fracturing models, has led to a proposed way forward with the potential to drastically reduce unstimulated sections of wellbore with a subtle, no-cost modification of standard practice.

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