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**Ovidiu Savin** and **Hui Yu\***, huiyu@math.columbia.edu. *The multiple membrane problem.*

Title: The N-membrane problem

Abstract: The N-membrane problem is the study of shapes of elastic membranes being pushed against each other. The main questions are the regularity of the functions modeling the membranes, and the regularity of the contact regions between consecutive membranes.

These are classical questions in free boundary problems. However, very little is known when N is larger than 2. In this case, there are multiple free boundaries that cross each other, and most known techniques fail to apply.

In this talk, we discuss, for general N, the optimal regularity of the solutions in arbitrary dimensions, and a classification of blow-up solutions in 2D. Then we focus on the regularity of the free boundaries when  $N=3$ .

This talk is based on two recent joint works with Ovidiu Savin (Columbia University). (Received January 11, 2021)