

Mathematical modeling of stents

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A stent is a mesh that is placed in a narrowed or closed part of a blood vessel to keep the vessel open to restore normal blood flow. There are dozens of stents on the market with a very complex structure and of different sizes, geometries, and then mechanical properties. Testing and designing stents that will meet the prescribed mechanical constraints can be a very demanding task. However, there is a very efficient way for this task, and it is based on the use of a reliable and simple one-dimensional mathematical model instead of the three-dimensional one. Numerical approximation of the solution of the model allows us to build very efficient simulations that can lead us to different conclusions about the global properties of the stent without producing it. This allows us to go a step further and look for stents that are optimal in some sense.

Thus, on the example of stents, we will approach the three cornerstones for new technologies: modeling, simulation and optimization.