Contemporary advanced simulation software allows, on the one hand, a more accurate understanding of material behavior at an architectural scale, and on the other, as a form-finding methodology. The potential of continual structural evaluation in form-finding allows for the morphology of an architectural system to be informed by physical laws instead of mathematical definitions in real-time, enabling the evaluation of multiple iterations of the same system to happen simultaneously.

However, despite the increasing tendency to utilize these softwares in architectural design research methodologies as a means of solving multiple variations of a (structural, material) system, there has not been much attempt to rethink the more generic digital tools that architects utilize today. This is an opportunity to begin to question and interrogate the way we utilize these tools, with a particular interest in how to incorporate open-source tools into or against the more generic softwares that are now increasingly used daily by architects. Thus far, the development of open source tools has remained largely within the problem-solving linked to specific architectural projects or problems. SoftModelling, on the other hand, is an open source Java application developed to...
address not only a specific project, but also cover the basic function of a digital design software. Its code is open source and easy to manipulate in order to facilitate the creation of multiple versions suitable for different users.

Most kinds of modeling software recompute the order of edges when any mesh operation is given. This is why a two-step process is normally utilized since the serial numbers of the particle-springs will not match the new edges’ serial numbers after this operation occurs. SoftModelling develops a strategy for each of the mesh operations in order to solve this. First, the app relocates the serial numbers of each edge on the mesh to maintain parity between the particle-springs linked to them. Then, instead of a recompilation of the particle-spring system, a detailed analysis of the mesh identifies the parts that have been modified, without affecting the rest of the object. This process not only improves the efficiency of the physics simulation but also facilitates a seamless integration between modeling and simulation. The synchronization of particles–vertices/springs to edges–enables the constant updating of the positions of each part of the model. What one models is automatically physics, and vice versa. There is a constant feedback between the physical behavior of every particle-spring of the 3D mesh subdivision as well as the variable scale and depth at every point, which leads to an output that is both physically and geometrically precise. This improves flexibility for the designer as one can modify and simulate simultaneously within a single software, as well as edit the GUI and the source code. It establishes an understanding that particle-spring systems can not only be used as a global framework, but also as a step-by-step transformative process for architectural design.
Explanatory diagram classifying the set of operations available in each selection mode – Vertex/Particle, Face or Edge Mode.
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