# Dynamic Textures for Topologically-Changing Volumes *

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## 1 Summary

This work presents a practical implementation for a seamless integration of dynamic textures on top of topologically changing volumes using the SOFA framework. The method consists of adding an interface to load OpenVolumeMesh (OVM) meshes [2] then, for illustrative purposes, coupling it with the SOFA Carving plugin [1] to generate textures and corresponding coordinates for newly exposed boundary faces. We have also implemented a Python script to 1) Access and manipulate attributes in the scene, 2) Load texture mapping files and apply them to the rendered model, 3) Duplicate vertices and update corresponding faces to generate a seamless texture mapping, and 4) Modify the C++ source with functionalities that support Python wrapping such as removing "texcoords" attributes at the right indices whenever a triangle is removed. In addition, we have implemented a `MeshOVMLoader` module for loading OVM meshes with seamless texcoords, that are embedded into the mesh file, and dynamically generating normals, following the current `MeshObjLoader` interface. A sample of our results is presented in Fig. 1. The benefits of dynamic textures will help improve realism of simulations, for instance during surgical simulation scenarios, and the benefits of include OVM data structure span across several applications beyond texture mapping, which we plan to investigate in the near future.

## References

1. Faure, F., Cotin, S.: SOFA: A Multi-Model Framework for Interactive Physical Simulation. vol. 11, pp. 283–321 (Jun 2012)
2. Kremer, M., Bommes, D., Kobbelt, L.: OpenVolumeMesh – A Versatile Index-Based Data Structure for 3D Polytopal Complexes. pp. 531–548. Springer (2013)

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**Fig. 1.** An example of texture mapping using the proposed method applied on a tubular structure using carving module.