論 文 の 内 容 の 要 旨

論文題目　Computational design with bending behavior of wood - explored through simulations on pliability of wood

(木材の曲げを用いたコンピュテーショナルデザイン一木材の屈撓性に関するシミュレーションを通じて)

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Wood has been a common construction material for the human beings since ancient times. While lamination technology has driven wood to become stronger and less prone to undesired deformations, people also never stop bending wood for various uses as it is a pliable material when certain conditions apply. However, the way to bend wood did not change much since ancient times. As a common practice in building industry, steam and much external force, equipment and spaces are usually required to bend wood. Thus, by taking advantage of the heterogeneous properties of wood, this research investigates into new ways to engineer wood surfaces and simulate their bending behaviors. The bending behavior is discussed in two categories: self-actuated bending and kerf bending of wood. The former utilizes the hygroscopicity and anisotropy of wood to manipulate the curvature of the bent wood, allowing for a 2-dimensional to 3-dimensional transformation; while the latter demonstrated a reverse process in which anisotropy is created in the homogeneous plywood. For either approach, physical prototypes and digital simulations were explored while the latter had a furniture-scaled physical output. By evaluating these two approaches for bending, design scenarios could be composed for using individual and combination of these bending methods by taking advantage of both of them.