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**Refining mapping strategies to improve the sound quality of physically- controlled synthesis**

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A new technique, called 'physically-controlled synthesis', is being developed to improve the controllability and sound quality of digital sound synthesis. It can be seen as a mapping strategy that combines a synthesis model based on a physical model (controllability) with a signal model based on additive synthesis (sound quality), and a database of pre-analyzed natural instrumental sounds.

A key point is the computation of perceptually relevant timbre descriptors that interface the two synthesizers to provide additive synthesis data by navigating the database and selecting neighbour additive frames to morph. To limit the latency introduced, we developed specific algorithms to extract sound features from the physical model; the database size was increased offline by using a higher control sampling rate.

In addition to previous works by the authors, devoted to the permanent regime and using a 2D indexation of the additive database, transients handling is achieved through a 3D search in a frame-by-frame basis that ignores the natural time unfolding, hence allowing to choose the best frame with the proper pitch in addition to the two other sound descriptors.