Advanced ordinary differential equation based head modelling for Chinese marionette art preservation

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Abstract

Puppetry has been a popular art form for many centuries in different cultures, which becomes a valuable and fascinating heritage asset. Traditional Chinese marionette art with over 2000 years history is one of the most representative forms offering a mixture of stage performance of singing, dancing, music, poetry, opera, story narrative and action. Apart from a set of string rules, which controls the dynamics, head carving skill is another important pillar in this art form.

This paper addresses the heritage preservation of the marionette head carving by digitalizing the head models with a novel modelling technique using ordinary differential equations (ODEs). The technique has been specially tailored to suit the modelling complexity and the need of accurate description of shapes. It offers smoothly sewing ODE swept patches to represent the distinct features of a marionette head with sharp variance of local geometry. Such features otherwise are difficult to model and capture accurately, which may require a great effort and tedious handcrafting of an experienced modeller, when using other representation forms like polygons. Copyright © 2015 John Wiley & Sons, Ltd.