ABSTRACT

A teleoperated system with haptic feedback helps to improve the skills of an operator who is located in a "remote area". These systems have many applications, one of them is minimally invasive robotic surgery, in which small incisions are used for surgical access with the aid of robotic systems controlled by a surgeon. In medical science, robotic surgery is the subject of many studies because of the advantages offered, such as better cosmetic results, reduced recovery time, and more precise surgical movements. This article presents a conceptual model of a robotic system for cardiac surgery, that uses a master-slave configuration, to implement bilateral algorithms for manipulating a robotic arm integrated with a commercial 3D joystick with force feedback, the Novint Falcon. There are several important aspects in the implementation: (a) to guarantee a fixed point of contact between the skin of the patient and the surgical instruments, as established by the surgeon, (b) to provide realistic force feedback in three degrees of freedom, which is the main objective of this work, and (c) to accurately track the position demanded by the surgeon to the robotic arm. Some test are presented for the conceptual validation of the above points using a didactic commercial robot.