



Dual Energy Scanning Beam X-Radiography

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Abstract

Dual energy X-radiography is a method first developed in the mid-1970's by which one uses the information contained in the energy spectrum of the transmitted X-ray flux through an object. With this information one can distinguish the types of materials present in a radiograph and thus allow a computer to subtract them from the image enhancing the contrast of the remaining materials. Using this method, one can see details, which would have been hidden by overlying structures of other materials such as seen in radiographs of parts, made up of mixtures of metals and composites. There is also great interest in this technique for medical imaging of the chest where images of the organs are significantly improved by subtracting the bones. However, even with the enhanced capabilities realized with this technique, the majority of X-radiography systems only measures the bulk transmitted X-ray intensity and ignores the information contained in the energy spectrum. This is due to the added expense, time requirements, and registration problems incurred using standard radiographic methods to obtain dual energy radiographs. This dissertation describes a novel method which overcomes these problems and allows one to perform inexpensive, near real time, single shot dual energy X-radiography. The work of this thesis resulted in US patent #5,742,660.