Purpose:
The DAVID system (PTW-Freiburg, Germany) is a multiwire ionization chamber placed in the accessory holder, capable of continuously monitoring treatment deliveries such as IMRT. As shown in previous work, an iterative deconvolution algorithm can correct the blurring of the signal profile by the lateral transport of secondary electrons within the chamber. First results of the implementation of the procedure into clinical routine and of the resulting enhanced error detection efficiency are presented.
Methods:
The measured signal profile of the wires can be regarded as resulting from a convolution of the true photon fluence profile with a lateral response function. After measuring the latter for each wire by simple slit measurements, a true signal can be approximated by an iterative deconvolution algorithm described in previous work of our group. Prior to the patient treatment, data for each field of an IMRT plan are measured during the pre-treatment verification. The data are deconvolved on-line and stored as reference values. During the daily treatment of the patient the measured and deconvolved readings are compared on-line with the reference values.
Results:
The application of the procedure is important for DAVID chambers designed for MLCs with 5 mm leaf width. In these the profile blurring by laterally scattered secondary electrons in the chamber can be of the order of the primary signal. By applying the deconvolution procedure the error detection efficiency of the DAVID system can be enhanced by a factor of approximately 2. The deconvolution of the profile is performed on-line with no remarkable loss of time.
Conclusions:
The implemented deconvolution algorithm corrects for the signal profile blurring of the DAVID chamber by laterally scattered electrons. The study has been implemented into the daily routine.