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(54) **PROPAGATION DELAY COMPENSATION AND INTERPOLATION FILTER**

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(57) **ABSTRACT**

Various embodiments provide a filter for propagation delay compensation and interpolation in encoder digital signal processing. The filter can include a first low pass filter configured to reduce noise of a digital input comprising a measured angular position; a first differentiator configured to receive a filtered digital input and to calculate a speed from a difference in time of the measured angular position and a previous angular position; a second low pass filter configured to reduce noise from the speed; a second differentiator configured to receive a filtered speed and to calculate acceleration using a difference in time of the filtered speed and a previous speed; a third low pass filter configured to reduce noise of the acceleration; and a delay compensator configured to receive the filtered digit input, the filtered speed, and a filtered acceleration, and to calculate a propagation delay compensated digital output.

