Quantitative and localized spectroscopy for non-invasive bilirubinometry in neonates
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Citation for published version (APA):
Bosschaart, N. (2012). Quantitative and localized spectroscopy for non-invasive bilirubinometry in neonates
### List of symbols

**general**
- $t$: time
- $f$: frequency
- $\lambda$: wavelength
- $k$: wave number
- $d$: depth
- $\varepsilon$: geometrical path length
- $\Delta\lambda$: wavelength resolution
- $\Delta k$: wave number resolution
- $\Delta f$: frequency resolution
- $h\nu$: photon energy
- $\varnothing$: diameter
- $r$: radius
- $D$: thickness

**optical properties**
- $\mu_t$: attenuation coefficient
- $\mu_a$: absorption coefficient
- $\mu_s$: scattering coefficient
- $\mu_s^{\text{red}}$: reduced scattering coefficient
- $\mu_b$: backscattering coefficient
- $\mu_b^{\text{NA-corrected}}$: NA-corrected $\mu_b$
- $\mu_{\text{eff}}$: effective attenuation coefficient
- $p(\theta)$: scattering phase function
- $g$: scattering anisotropy
- $n$: phase refractive index
- $n_g$: group refractive index
- $a$: scattering scaling factor
- $b$: scatter power
- $c$: chromophore concentration

**diffusion theory**
- $I$: spectral intensity
- $R$: remittance
- $r_j$: fiber distance from source
- $z_0$: modeled source position
- $z_b$: modeled virtual source position
- $A$: empirical parameter
- $\alpha$: proportionality factor
- $\beta, \gamma$: validity limiting parameters

**LCS signal description**
- $E_S$: electric field in the sample arm
- $E_R$: electric field in the reference arm
- $E_D$: electric field at the detector
- $I_S$: sample arm intensity
- $I_R$: reference arm intensity
- $i_D$: photo detector current
- $i_{AC}$: AC photo detector current
- $S$: power spectrum

**LCS system and geometry**
- $x_S$: sample arm length
- $x_R$: reference arm length
- $\Delta L$: optical path length difference
- $\lambda_0$: center wavelength
- $\lambda_{\text{FWHM}}$: wavelength bandwidth
- $l_c$: coherence length
- $S_0$: source power spectrum
- $T_c$: system coupling efficiency
- $\zeta$: system calibration constant
- $\alpha$: scaling factor
- $\xi$: focus position in path length units
- $Z_0$: Rayleigh length
- $w$: beam waist
- $Q$: solid angle
- $\Theta$: (focusing) angle
- $M$: number of modes

**LCS acquisition**
- $\Delta x_s$: sample arm displacement
- $\Delta x_R$: reference arm displacement
- $v_R$: reference mirror velocity
- $f_R$: reference mirror scanning frequency
- $\Delta R$: reference mirror scanning amplitude
- $\Delta D$: path length scanning window
- $N$: number of samples
- $f_s$: sampling frequency

**Brownian motion**
- $f_D$: Doppler frequency shift
- $k_B$: Boltzmann constant
- $T$: temperature
- $\eta$: viscosity

**LCS spectroscopic detection**
- $n_{S}, n_{R}$: sample/reference arm fraction
- $d_{\text{max}}, \Delta L_{\text{max}}$: imaging depth/path length
- $\delta k, \delta \lambda$: spectrometer pixel width
- $N_p$: # pixels
- $\tau$: integration time
- $f_D$: Doppler frequency
- $\varepsilon$: detection efficiency
- $\Delta \xi$: reference mirror scanning window
- $\Delta \xi_{\Theta}$: spectrograph probing window

**bold-faced** printed characters in this thesis denote wavelength dependent parameters